NORMAN A. JOHNSON
Editor

CHARLES A. WHITEHEAD
Managing Editor

MYRON D. REESER
Business Manager

HERBERT A. STAUDERMAN
Advertising Manager

JAMES A. DOYLE
Promotion Manager

FRANK R. MURPHY
Production Manager

LILLIAN M. THOMPSON
Circulation Manager

AATCC

OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday by the HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes, President; Ernest J. Finan, Executive Vice-President; Norman A. Johnson, Vice-President & Treasurer; Myron D. Reeser, Vice-President; C. Essenbreis, Secretary.

Telephone SPring 7-9364

AMERICAN

DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING • DYEING • PRINTING • FINISHING

Contents

VOLUME 43 MAY 24, 1954 NUMBER 11

• *Special Article*

An Evaluation of a Tensioning Device for Use with the Taber Abraser 341
Elizabeth Flowers Thomas and George Sims Wham, Jr

• *Departments*

General Calendar 343
Patent Digest 344
Paul Wengraf
Abstracts 346
News 350

• *Proceedings of the American Association of Textile Chemists and Colorists*

William Hamlin Cady Elected Honorary Member P326
AATCC Calendar P326
Employment Register P326
Rhode Island Section:—
Symposium on Fiberglas Textiles P327
J K Park, Moderator
The Finishing, Dyeing and Printing of Glass Decorative Fabrics.. P327
R F Caroselli
Glass Fibers — Chemical Characteristics and Coating Techniques. P329
Alfred Marzocchi
New Industrial Applications of Fiberglas Textiles P330
Richard C Horton
Western New England Section:—
Surface-Active Agents and Their Far-Reaching Influence in the Textile Industry. P331
P J Sullivan
Membership Applications P334
1953 Annual Convention:—
Adsorption of Detergent in the Dyeing Process P335
Lawrence Flett and L F Hoyt
Reports from Local Sections P338

Copyright, 1954, Howes Publishing Co, Inc

Contents of previous issues can be found by consulting the Industrial Arts Index and the Engineering Index, Inc, at your library

three good names are better than one!

1 Your good name as a reputable dyer or converter.

2 Our good name as a reputable dyestuff supplier.

3 The good name of the American Institute of Laundering as a reputable research and testing laboratory.

safeguard your good name by using

Superlitefast® direct dyes

AMERICAN INSTITUTE OF LAUNDERING CERTIFIED COLOR-FAST

the first range of dyes* *certified colorfast*

by the American Institute Of Laundering

for further information, please contact

ALTHOUSE Chemical Company, Inc.

READING, PENNSYLVANIA

*when treated with the polyantherenes or finished with urea of formaldehyde

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1954, American Association of Textile Chemists and Colorists

Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

MAY 24, 1954

National Officers of the Association

President.....J ROBERT BONNAR, General Dyestuff Corporation, 435 Hudson St, New York 14, N Y

Vice President (Central Atlantic Region).....GEORGE L BAXTER, Bradford Dyeing Association, 40 Worth St, New York 13, N Y

Vice President (Southern Region).....SAMUEL L HAYES, Ciba Co, Inc, P O Box 1988, Charlotte 1, N C

Vice President (Western Region).....JOSEPH H JONES, Phoenix Dye Works, 1963 Southport Ave, Chicago 14, Ill

Vice President (New England Region)....GEORGE O LINBERG, Synthron, Inc, Ashton, R I

Secretary..HAROLD C CHAPIN, Lowell Technological Institute, Lowell, Mass

Assistant Secretary.....RICHARD R FREY, Lowell Technological Institute, Lowell, Mass

Treasurer.....ALBERT E SAMPSON, National Aniline Division Allied Chemical & Dye Corp, 150 Causeway St, Boston 14, Mass

Founder.....LOUIS A OLNEY (Deceased)

Chairman of the Executive Committee on Research....LEONARD S LITTLE, 101 West 31st Street, Room 1500, New York 1, N Y

Director of Research....HAROLD W STIEGLER, Lowell Technological Institute, Lowell, Mass

Standing Committees of the Council

Technical Committee on Research.....CHARLES W DORN, *Chairman*
Publicity.....GEORGE H SCHULER, *Chairman*
Conventions.....KENNETH H BARNARD, *Chairman*
Appropriations.....ALBERT E SAMPSON, *Chairman*
Constitution and Bylaws.....HAROLD C CHAPIN, *Chairman*
Membership and Local Sections.....SAMUEL L HAYES, *Chairman*
Corporate Membership.....ALBERT E JOHNSON, *Chairman*
Publications.....PERCIVAL THEEL, *Chairman*
Technical Programs.....WALTER M SCOTT, *Chairman*
Technical Supplies.....HAROLD C CHAPIN, *Chairman*

Councilors

Representing Sections

NEW ENGLAND REGION

Northern New England: ELMER E FICKETT, JOHN P PLOUBIDES, ROBERT D ROBINSON, SAWYER F SYLVESTER
Rhode Island: ERNEST J CHORNYEI, RAYMOND W JACOBY, THORWALD LARSON, EDWARD W LAWRENCE
Western New England: RAYMOND J CAREY

CENTRAL ATLANTIC REGION

Hudson Mohawk: ALBERT E HERRMANN, JR
New York: ROBERT C ALLISON, MATTHEW J BABEY, CHARLES W DORN, WELDON G HELMUS, PATRICK J KENNEDY, PAUL J LUCK, JAMES J MARSHALL
Philadelphia: CARLETON T ANDERSON, EDWARD C DIEHL, HARRY L MORGAN, ANGE E RAIMO, ERNEST E RETTBERG, JR, JACKSON A WOODRUFF

SOUTHERN REGION

Piedmont: HARLEY Y JENNINGS, JOSEPH LINDSAY, JR, M M McCANN RAPHAEL E RUPP, R HOBART SOUTHER
South Central: JOSEPH D MOSHEIM
Southeastern: S JACK DAVIS, H GILLESPIE SMITH
Washington: WALTER M SCOTT

WESTERN REGION

Mid-West: ARTHUR T BRAINERD, SAMUEL KLEIN, ELLIOTT MORRILL
Pacific Northwest: GEORGE S BARKER
Pacific Southwest: ANGUS H ROBERTS

Past Presidents

ELVIN H KILLHEFFER, P J WOOD, WILLIAM H CADY, ALBAN EAVENSON, CARL Z DRAVES, THOMAS R SMITH, WILLIAM D APPEL, HENRY F HERRMANN, C NORRIS RABOLD

Local Section Officers

New England Region

NORTHERN NEW ENGLAND

Chairman.....ERNEST R KASWELL, Fabric Research Laboratories, Inc, 665 Boylston St, Boston 16, Mass
Secretary.....AZEL W MACK, Dexter Chemical Corp, 581 Boylston St, Boston 16, Mass
Vice-Chairman—JOHN M GOULD *Treasurer*—WILLIAM W PENNOCK

RHODE ISLAND

Chairman.....ARTHUR F McLEAN, Glenlyon Print Works, Phillipsdale, R I
Secretary.....CHARLES F STOKES, Carbic Color & Chemical Co, 87 Weybosset St, Providence, R I
Vice Chairman—REMUS F CAROSELLI
Treasurer—J WILLIAM TIMPERLEY

WESTERN NEW ENGLAND

Chairman.....ARTHUR S NYQUIST, American Cyanamid Co, 1937 W Main St, Stamford, Conn
Secretary.....NATHANIEL J GLADE, American Cyanamid Co, 1937 W Main St, Stamford, Conn
Vice Chairman—SOCRATES V VANIOTIS
Treasurer—THOMAS J GILLICK, JR

Central Atlantic Region

HUDSON-MOHAWK

Chairman.....IRWIN J SMITH, Surpass Chemical Co, 1254 Broadway, Albany 1, N Y
Secretary.....WILLIAM A NELSON, Ritter Chemical Company, Inc, 403 W Main St., Amsterdam, N Y
Vice-Chairman—HARVEY G GENDREAU *Treasurer*—JOHN W MERRILL

NEW YORK

Chairman.....WELDON G HELMUS, Fair Lawn Finishing Co, Fair Lawn, N J
Secretary.....NORMAN A JOHNSON, American Dyestuff Reporter, 44 East 23rd St, New York 10, N Y
Vice-Chairman—JOHN H HENNESSEY *Treasurer*—GEORGE A JONIC

PHILADELPHIA

Chairman.....FREDERICK V TRAUT, Globe Dye Works Co, 4500 Worth St, Philadelphia 24, Pa
Secretary.....THOMAS J SCANLON, Dexter Chemical Corp, P O Box 211, Springfield, Delaware County, Pa
Vice Chairman—THOMAS H HART *Treasurer*—PERCIVAL THEEL

Southern Region

PIEDMONT

Chairman.....HENRY A RUTHERFORD, School of Textiles N C State College, Raleigh, N C
Secretary.....CLARENCE HOOPER, Burlington Mills Corp, Burlington, N C
Vice-Chairman....H J JORDAN, JR *Treasurer*....C O STEVENSON

SOUTH CENTRAL

Chairman.....PAUL O ANDERSON, Peerless Woolen Mills, Rossville, Ga
Secretary.....WILLIAM F LUTHER, Dixie Mercerizing Co, Chattanooga 1, Tenn
Vice Chairman—JOE T BOHANNON, JR *Treasurer*—J C WHITT

SOUTHEASTERN

Chairman.....T HOWARD McCAMY, Pepperell Mfg Co, Lindale, Ga
Secretary.....JOHN C COOK, W R C Smith Publishing Co, 806 Peachtree St, N E, Atlanta, Ga
Vice-Chairman.....W B GRIFFIN *Treasurer*.....J W SWINEY

WASHINGTON

Chairman.....MILTON HARRIS, Harris Research Laboratories 1246 Taylor Ave, N W, Washington 11, D C
Secretary.....GEORGE S BUCK, JR, National Cotton Council of America, 1832 M St, N W, Washington 6, D C
Vice-Chairman—HENRY D BARKER *Treasurer*—HERBERT A EHRMAN

Western Region

MID-WEST

Chairman.....J GORDON STOTT, Ciba Co, Inc, 325 West Huron St, Chicago 10, Ill
Secretary.....HARRY W ERICSON, American Aniline Products, Inc, 820 South Clinton St, Chicago 7, Ill
Vice Chairman—ARTHUR I HULTBERG *Treasurer*—JACK G KELLEY

PACIFIC NORTHWEST

Chairman.....DON E ADAMS, Portland Woolen Mills, 6639 North Baltimore Ave, Portland 3, Ore
Secretary....THEODORE M MARSHALL, Nyanza Color and Chemical Co, Inc, 115 SW Fourth Ave, Portland 4, Ore
Vice-Chairman—ROBERT E NEWMAN *Treasurer*—JOHN L AYRES

PACIFIC SOUTHWEST

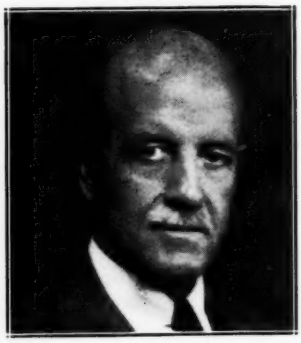
Chairman.....SIDNEY SPRINGER, 311 South San Pedro St, Los Angeles 13, Calif
Secretary.....CLARICE H LINDSEY, Univ of California, Dept of Home Economics, Los Angeles 24, Calif
Vice-Chairman—ROBERT C ROTH *Treasurer*—SERGIO M DADONE

Student Chapters

BRADFORD DURFEE TECHNICAL INSTITUTE, CLEMSON COLLEGE, FAIRLEIGH DICKINSON COLLEGE, GEORGIA INSTITUTE OF TECHNOLOGY, LOWELL TECHNOLOGICAL INSTITUTE, NEW BEDFORD INSTITUTE OF TEXTILES AND TECHNOLOGY, NORTH CAROLINA STATE COLLEGE, PHILADELPHIA TEXTILE INSTITUTE, RHODE ISLAND SCHOOL OF DESIGN, UTICA TECHNICAL INSTITUTE

William Hamlin Cady Elected Honorary Member

THE Association by an unanimous vote of its Council has elected William Hamlin Cady of Providence, R I, an Honorary Member. He is the fourth member to be so honored in the thirty-three years of the Association's existence. His long record of accomplishment in textile dyeing and chemistry stretches from the time of his AB (1898) and AM (1905) degrees from Brown University to his present position of co-ordinator and American editor of the *Colour Index*, a monumental study and tabulation by AATCC and the Society of Dyers and Colourists, due to be published in 1955. Mr Cady was chemist and demonstrator in this country from 1899 to 1917 for two of the largest German dyestuff manufacturers, Farbenfabriken and Badische. From 1918 to 1922 he was chief chemist for U S Finishing Co, and from 1922 to 1929 was research chemist for Pacific Mills. In 1929 he became chief chemist of the Slater Co, Webster, Mass, now one of the plants of Cranston Print Works. In 1931 he left Slater, returning to U S Finishing as chief chemist until 1946 when he resigned to take over the *Colour Index* work.



W H Cady

Mr Cady was a Charter Member and was elected fifth president of AATCC. He received the Olney Medal on December 12, 1946 and the words of that citation best describe his life work . . . "accomplished textile chemist, master colorist, life-long student and beloved friend, for valuable contributions to textile chemistry and dyeing and exceptionally meritorious services in the advancement of the textile chemical industry. William H Cady has conducted important and productive research for the benefit of the industry on colorfastness and methods for evaluation on textile printing. His wealth of knowledge and experience have been given freely to all, and his keen criticisms and constructive counsel have been an invaluable guide".

Mr Cady was informed of his election to Honorary Membership at a luncheon held at the Sheraton-Biltmore Hotel, Providence, R I, on May 6th, attended by a national committee composed of E W Lawrence and Thorwald Larson and the following Rhode Island Section officers and councilors: Arthur F McLean, Charles F Stokes, Raymond W Jacoby, Alden D Nute and Raymond B Taylorson.

AATCC CALENDAR

COUNCIL
1954—June 15, Sept 15, Nov 19.
1955—Jan 21, Apr 15, June 17

NATIONAL CONVENTIONS
Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J; 1956 (New York); 1957 (Boston).

HUDSON-MOHAWK SECTION
June 18 (Outing).

MID-WEST SECTION
June 11-13 (Annual Outing—Lake Lawn Lodge, Delavan, Wis).

NEW YORK SECTION
June 18 (Outing, North Jersey Country Club, Wayne, N J).

NORTHERN NEW ENGLAND SECTION
June 11 (Outing—Merrimack Valley C C, Methuen, Mass); Oct 8 (Colonial C C, Lynnfield, Mass); Dec 10 (Woodland Golf Club, Auburndale, Mass).

PIEDMONT SECTION
June 11-12 (Outing, Mayview Manor, Blowing Rock, N C); Oct 16 (Hotel Barringer, Charlotte, N C).

PHILADELPHIA SECTION
Sept 24, Oct 29 (Penn-Sherwood Hotel, Philadelphia, Pa); Dec 3 (Kugler's Restaurant, Philadelphia).

RHODE ISLAND SECTION
June 11 (Outing—Wannamoisett C C); Oct 14 (Johnson's); Dec 2 (Annual Meeting—Sheraton Biltmore, Providence, R I).

SOUTH CENTRAL SECTION
June 4-5 (Summer Outing — Chattanooga Golf and Country Club); Dec 4 (Hotel Patten, Chattanooga).

SOUTHEASTERN SECTION
Dec 11 (Atlanta-Biltmore, Atlanta, Ga).

WESTERN NEW ENGLAND SECTION
June 18 (Outing—Chase Country Club, Waterbury, Conn); Oct 1, Nov 12, Dec 10 (Rapp's).

(A general calendar of events may be found on page 343)

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

54-9

Education: BS, business administration.

Experience: Control laboratory and dyehouse foreman, rayon.

Age: 36; married; references on request; position in technical sales desired; Southeastern US preferred. 5-10, 5-24

Buttons bearing the insignia of the AATCC are now available from the Secretary at a new price of $2.25. Pins, with safety clasp, are also available at $2.50 each. Write directly to H C Chapin, AATCC Secretary, Lowell Technological Institute, Lowell, Mass.

Rhode Island Section——

SYMPOSIUM ON FIBERGLAS TEXTILES*

Panel and Moderator from
Owens Corning Fiberglas Corp, Ashton, R I

J K Park

PANEL
J K PARK, *Moderator*
Laboratory Director
R F CAROSELLI
Manager, Decorative Fabrics Dev
RICHARD C HORTON
Manager, Industrial Fabrics Dev
ALFRED MARZOCCHI
Manager, Textile Yarns Dev

R F Caroselli

* Held in the quarters of the Providence Engineering Society, Providence, R I, on Friday evening, October 23, 1953. Submitted to the Reporter by the Editor of Proceedings on April 12, 1954.

THE FINISHING, DYEING AND PRINTING OF GLASS DECORATIVE FABRICS

R F CAROSELLI

SINCE it would be impossible to divorce any discussion of glass decorative fabrics as we know them today from the Coronizing process, tonight we shall attempt to hinge this entire discussion upon a description of the Coronizing process itself, and we shall use this schematic drawing of a Coronizing unit as our outline (Figure 1).

Many of you have heard Coronizing described as a high-temperature heat-setting process very similar to those now in use on other synthetics. I am afraid its explanation cannot be quite that simple. True, the first step in the operation depicts the passage of glass fabric through a muffle, the temperature of which is maintained at 1200° F. But let's consider for a moment just what happens to this fabric during its five to fifteen seconds' trip through this oven.

First, all organic matter which might be lying on the fabric in the form of yarn or warp sizing is instantaneously distilled or burned off, thus leaving a perfectly bare glass surface. Secondly, we note that a permanent crimp has been set in the fibers that conforms to the pattern of weave. A closer study further reveals that these long glass rods no longer seem to be stiff and seem to be relaxed and soft and limp. Furthermore, the fabric seems to be wrinkle-proof, certainly more wrinkle-resistant than any competitive fabric. And this would be expected, for, since glass has virtually no yield point at ordinary temperatures, all wrinkling is instantly recoverable.

The Coronizing process consists, in its first step, of passage of woven Fiberglas fabric for 5 to 15 seconds through an oven at 1200°F where sizes or any other organic materials are burned and distilled off the glass, the weave is set, and the fibers are relaxed. This oven also imparts wrinkle resistance. The fabric is then treated with a resin finish on a padder, the resin being set in an oven at 320°F. When desired, colored pigment is added to the resin finish. The goods are finally padded with stearatochromic chloride, which, when cured at 340°F, binds the resin finish with any pigment to the surface of the glass and ensures the best possible abrasion resistance.

This is all very heartening, but, upon additional scrutiny of the glass fabric as it leaves this heat-set oven, we are quickly struck with the fact that here we have bare glass, and bare glass rods are quick to abraid one another. As the fabric leaves this oven it is in its most vulnerable state. It would take altogether too little motion to cause these fibers to wear one another out.

The challenge, then, to the finisher is obvious. An abrasion-resistant finish must be applied and as soon as possible. That is the reason for the pad that immediately follows the heat-set oven.

Now, let's see what we can fill this pad box with. Remember, that going into this box is the nearest thing to a wrinkle-proof fabric imaginable. Most any protective coating that can be applied to it will tend to deaden its wrinkle recoverability. However, a search of all known resins and chemicals that are noted for their resistance will reveal a few, which, though they do not retard this wrinkle recoverability, still leave us with a fabric that has the best "no ironing" story in the field.

So, now, we find ourselves with a list of materials we might use. But, then, we remember that the fabric as it left the heat-set oven was bare glass and therefore incombustible. A test of the list of chemicals gathered above shows that a goodly portion of them go up in flames when used as a protective coating on this fabric. But things are not too disheartening, for there are still quite a few that pass even this severe test, and thus the wonderful fire-safety quality of glass fabrics can be maintained.

Now, we have a fabric that needs no ironing, has good, practical abrasion resistance and does not burn. But this is not enough, a good drapery fabric must have good hand and must drape well, and we soon discover that some of the compounds we have selected to place in our pad box have robbed all the good draping qualities from our original bare glass. Thus, a few more prospects go by the board.

The number of eligible materials seems to become small indeed, now, and we have our severest test still before us. To be a decorative fabric a fabric must have color. Pigments of course comprise the logical answer, but how well do these few remaining resins bind these pigments? More compounds are eliminated. And

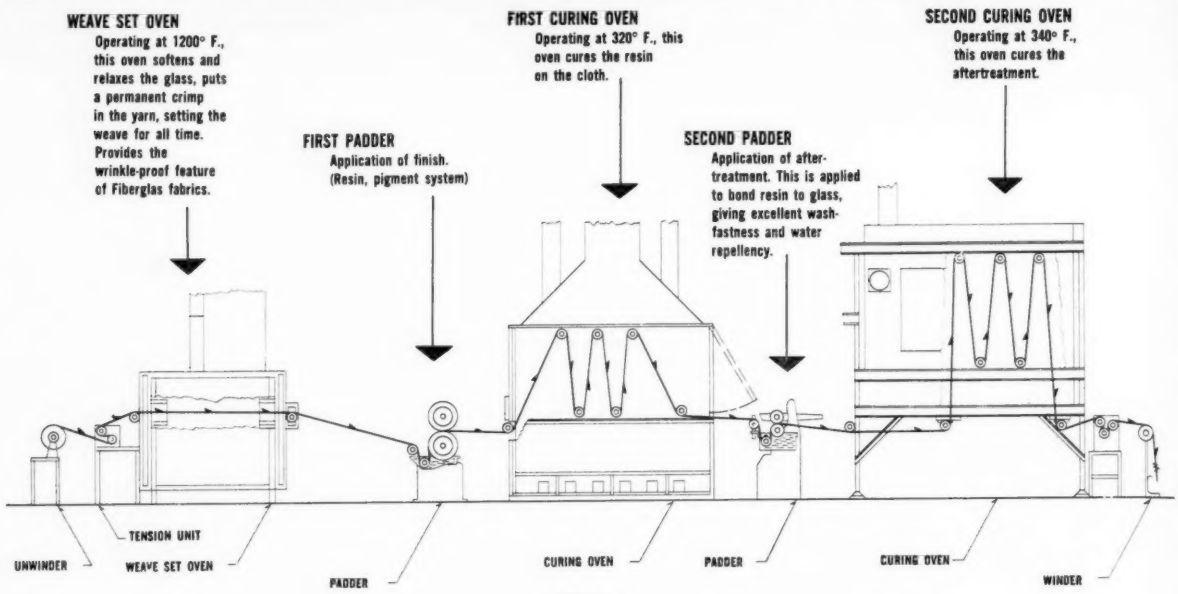

WEAVE SET OVEN
Operating at 1200° F., this oven softens and relaxes the glass, puts a permanent crimp in the yarn, setting the weave for all time. Provides the wrinkle-proof feature of Fiberglas fabrics.
FIRST PADDER
Application of finish. (Resin, pigment system)
FIRST CURING OVEN
Operating at 320° F., this oven cures the resin on the cloth.
SECOND PADDER
Application of after-treatment. This is applied to bond resin to glass, giving excellent wash-fastness and water repellency.
SECOND CURING OVEN
Operating at 340° F., this oven cures the aftertreatment.
UNWINDER
TENSION UNIT
WEAVE SET OVEN
PADDER
CURING OVEN
PADDER
CURING OVEN
WINDER

Figure 1

A schematic drawing of the Coronizing operation for finishing Fiberglas fabrics, showing the basic operations performed.

then comes the question of the aging characteristics of the resins chosen, their resistance to sunlight and atmospheric gases and organisms. After all, bare glass is not at all affected by any of these. We'd like to stay as close as possible to all of the basic strong points of glass. It is not surprising then that at this point there are not many materials remaining to choose from.

You might ask, now, "What need is there for the second pad box and drying oven if all this has been accomplished in this first padding?" The answer to this must come in the form of an apology and also as a challenge to you men in the audience tonight. We have not as yet been able to uncover a resin which, by itself, will bond sufficiently well to glass fabrics that it will withstand normal washing and drycleaning. We're still looking for such a material, and many of you are helping us, and I hope still many more will join in the search.

But lack of this one-pad system does not mean defeat, and with the aid of this second padding we are able to turn out fabrics of excellent laundering and drycleaning properties. Our answer to what the contents of this second pad should be quickly pointed to one compound: stearatochromic chloride. A few tenths of one percent of this material over the acrylonitrile-latex material, which is our current occupant of the first pad box, is all that is required. This stearatochromic chloride complex has amazing affinity for glass and also for certain chemical groupings. We find that it attaches itself to glass and to the resins coated on the glass thus indirectly bonding the two together. This time the coating is permanent. Several automatic machine washes run in succession fail to show any loss of finish.

To date the most popular finishes on glass fabrics are based on the acrylonitrile-type latices mentioned before overpadded with stearatochromic chloride. These finishes give fabrics that never require ironing, have good abrasion resistance, have excellent aging and sun-resistance qualities, do not burn and will not mildew nor rot nor stretch nor shrink. Their color retention is also excellent.

Printing on glass fabrics is done over one of the acrylonitrile finishes and can be done both with the water-phase and oil-phase types of resin-pigment systems. Not all the known resin-pigment systems will work on glass, for here again we have to depend on the stearatochromic chloride to get adequate fixation of resin to glass, so that only those systems work that can be fixed by stearatochromic chloride, and even those systems are subject to the rigid screening process we just carried out in the first pad box.

Now, in spite of all the wonderful properties we have succeeded in engineering into our present glass decorative fabrics, there is still need for improvement. Poor abrasion resistance is still considered a problem. Although we have overcome it sufficiently well to turn out satisfactory curtain and drapery materials, we still have to shy away from other end uses where more severe abrasion resistance is indicated; slipcover and upholstery materials are examples of these. Our laboratories are constantly working on this problem and through many approaches. One of course is the finishing or chemical approach. Another is through glass composition itself. Still another is through a different physical design of glass yarns themselves; we are just beginning, for example, to field-evaluate staple or spun yarns with the view of better abrasion resistance.

Another problem lies in the lack of deep shades in our pad-dyed fabrics. Many of you people are working with us on this one. Still another with which some of you are already familiar is the search for a grease-resistant finish suitable for tablecloths. Although glass itself sheds grease readily when laundered, several of the finishes which we have to use to improve abrasion resistance do not do so. There is a large waiting market for glass tablecloths, with their beautiful white sheen, their wonderful no-ironing story and their always wrinkle-free smooth appearance, but butter and grease stains are still a block to this market.

This has been a short summary of glass finishing techniques as they are known today. Many of you here tonight have had a great part in the fine progress these fabrics have made during the past two years, and no one realizes any better than I that future progress is greatly contingent upon the co-operation we get from the members of this type of group.

GLASS FIBERS—CHEMICAL CHARACTERISTICS AND COATING TECHNIQUES

ALFRED MARZOCCHI

A Marzocchi

The behavior of a glass fiber with heat, its exceptional chemical inertness, and the structural reason for its strength and elasticity are explained. Glass is transparent and essentially colorless. Although it can be dope-colored by the usual glass-coloring methods or colored by melting metallic compounds into the surface, only pastel shades can be attained by these methods. Deep shades of great variety can be produced, however, by coating the surface with a protein and then dyeing with acid direct colors.

LIKE all textiles, glass fibers are polymeric in nature, but unlike organic fibers, with which you are well acquainted, the polymer is based on silicon rather than carbon. The silicon is in its oxide form as a silicon dioxide network and, unlike polymers in other textile fibers, is completely cross-linked, that is, polymerization has occurred linearly as well as at right angles to the linear direction. A completely cross-linked carbon polymer is unsuited for fiber formation, but in this case a structure having no definite melting point but a long softening range is prepared by dissolving various metallic oxides within the silica network, thus lowering the melting point and yielding a solution which is mobile at high temperatures of about 2000°F. Cooling of this melt results in a gradual increase in viscosity until a rigid structure is produced. It is this range of viscosity and the fact that glass can be deformed at these intermediate temperatures, which makes glass fibers possible.

Textiles as a group depend on a linear polymerization of the monomer for flexibility. Since the glass polymer is completely cross-linked, flexibility is attained by attenuating the filaments to very small diameters. Thus, we might consider each fiber, regardless of length, as a single silica molecule with a slightly degraded structure caused by the metallic oxides in its network. As a result of this the filaments have low stretch (3-4%) with complete elasticity.

The silica network is an extremely rigid structure, which will not swell from water absorption even if the lattice is completely open as in the case of silica gel. In glass fibers, however, the network is completely filled, as is indicated by the diagram. In this we have pictured a silica lattice with holes formed by other metallic oxides. Because of this compact structure and the lack of cells or other voids, water will not penetrate glass fibers but is merely adsorbed on the surface. Here, due to its polarity, it is held quite strongly and only under special conditions is it possible to remove the last few layers.

Since the polymer is composed of a combination of metals, already in their oxidized state, the fibers will not burn or oxidize when heated in the presence of oxygen. Also, because of the low level of chemical activity of the metallic oxides used, they are unaffected by a wide range of chemicals and are only susceptible to the action of such materials as alkalis, hydrofluoric acid and hot phosphoric acid. The filaments are free of surface imperfections, and, even under the extreme magnification of an electron microscope, a perfectly smooth surface is indicated. This smoothness affects the adhesion of resin, which can only be accomplished through chemical bonding or an envelopment of the fiber.

As stated previously the softening point of glass fibers is extremely high. Cold flow or yield under stress is nonexistent at room temperature, and appreciable flow occurs only after the fiber has reached temperatures of around 5-600°F. As a result of this behavior, creasing or wrinkling of bare glass fabrics is impossible at room temperatures.

As you all know, glass fibers have extremely high tensile strengths. This is due not only to the primary valence bonds of the silica network, which must be ruptured, but also to the highly stressed and expanded state of the network caused by a rapid cooling of the fiber from forming to room temperatures. The effects of this expanded and stressed state is indicated by an appreciation of the tensile strength of bulk glass, which is of the order of 10,000#/sq inch, wheras glass fibers have tensile strengths in excess of 400,000#/sq inch.

Proof of the expanded and stressed structure is also deduced from the behavior of glass fibers when reheated after forming. Up to a temperature of 400°F the filaments shrink and the glass density increases. Above this temperature the fiber begins to elongate. This elongation is accelerated by further increases in temperature until maximum flow is attained above 2000°F. Aging of the fiber at temperatures above 400°F results in a roughening of the surface, which is believed to be due to the formation of crystals within the structure.

Individual glass filaments have no fatigue and can be flexed indefinitely with no apparent effect. The coefficient of friction of fiber on fiber, however, is extremely high. As a result the abrasion resistance of uncoated glass filaments is extremely low. To alleviate this condition and make it possible to process this material, the filaments must be coated and lubricated to protect them. The materials used in this application must be so designed that protection will occur without stiffness or excessive lubricity, which would affect further processing.

The individual filaments, as in any glass of like composition, are transparent, but, because of the extreme fineness of the filaments, the yarn appears white. Dope dyeing or chrom spinning of the fibers has been practiced on a very limited scale with standard glass-coloring techniques. These involve the addition of various colored metallic oxides and elements to the glass batch. However, only pastel shades are possible since the materials have very low tinctorial value with low opacity. Colors of extreme temperature resistance can be produced by coating the surface of the fibers with metallic salts and firing the resultant product. This technique, however, is very difficult to control and results only in pastel shades. A more

successful technique, which allows us a wider range in colors and better depth of shade, involves an actual change in the glass-fiber surface by coating it with a protein material, which is susceptible to direct or acid dyes. Using this method we are able to package-dye our yarns. Another variation utilizes a pigment-dyeing technique in which the pigment is held on the surface of the fiber by a resinous material attached to the surface of the glass. This was covered by Mr Caroselli in his discussion of the decorative aspects of glass fibers.

In this you will note that we rely on the adhesion of materials to glass surface. This technique is also used in the coating and lubrication of glass fibers. In this we are presently studying chemical compounds, which exhibit good adhesion to glass surfaces. Our aim in this project is the production of a resin that is especially suitable for glass-fiber processing. In line with this it becomes quite evident that dye molecules can be synthesized which will of their own accord adhere to glass-fiber surface.

NEW INDUSTRIAL APPLICATIONS OF FIBERGLAS TEXTILES

RICHARD C HORTON

THE advantages, both economically and propertywise, of Fiberglas textile materials have resulted in their utilization by a number of well-diversified industries. Interesting new applications of Fiberglas products include methods of lubrication for extrusion of hot metals, an insect screening that will not corrode, a lightweight firehose, an improved gypsum wallboard, a reinforced foam rubber, and a strong paper twine.

Faster metal forming has been made possible by the use of glass fibers as a lubricant during a hot-extrusion method recently introduced. A glass-fiber sleeving is slipped over a hot metal ingot, melts, and the molten glass acts as a lubricant for the steel as it is forced through the die.

Polyvinylchloride-coated Fiberglas yarns and cords are finding use in such dissimilar products as insect screening and firehose. These coated glass yarns are produced by passing the yarn through a vinyl plastisol or organosol, a wiping die, an oven, and onto a spool on a constant-speed winding mechanism. Resin pickup varies between 35 and 50 percent, depending upon the end use. The yarns to be coated are treated with a water-repellent size during manufacture or are passed through a predip repellent bath in the coating sequence. The coated Fiberglas yarns are woven into an insect screening fabric, which combines the properties of rust and corrosion resistance, high strength, dimensional stability, heat and flame resistance, low-temperature flexibility, color stability, low cost and good handling characteristics. The woven goods are heat-set to obtain locking at the crossovers. This can be done on the loom or on a tenter frame. The heat setting eliminates fraying and reduces the tendency to curl, making the screen fabric easy to cut and install.

A heavy vinyl-coated Fiberglas cord is used as the reinforcement in a woven fire-hose jacket. It is claimed that this type of hose is 20 pounds lighter per 100 feet than conventional cotton hose. The water absorption of the glass fiber reinforced jacket is greatly reduced, while the capacity of the hose in gallons per minute is greatly increased because of the possible use of a thinner rubber wall.

R. C. Horton

Because of the resistance of Fiberglas to heat, light, insects, micro-organisms, and chemicals and because of its smoothness and strength, Fiberglas textiles are finding extensive industrial uses. For some purposes, such as insect screening and firehose, it is advantageously coated with polyvinylchloride. Staple Fiberglas is employed to reinforce wallboard and other materials, such as plastics and foam rubber.

Fiberglas continuous strand, chopped into half-inch lengths, is used as a reinforcing medium in gypsum wallboard to replace such conventional fillers as asbestos, cork, wood pulp and cellulosic fibers.

Previous to the adaption of the use of chopped Fiberglas into the general line of gypsum board, these fibers had been used to increase the fire-resistance ratings of wallboards by as much as 300 percent. More recent work has resulted in a Fiberglas-reinforced wallboard with improved flexibility, greatly increased resistance to shock, less chipping and breaking at the corners, better nailability, and increased rates of production. This activity developed as a result of the introduction of a cheaper form of glass fibers suitable for use by the gypsum industry. This form, called "spun roving", is manufactured by running a continuous strand from a spinnerette at 2 miles a minute into a pegged spinning device, which interrupts the strand continuity and forms loops of controlled size. These loops are then gathered at a guide eye and wound onto the shipping package, which weighs 35 pounds. The spinning mechanism imparts a slight twist to the roving as it moves from the spinner to the eye. The roving is chopped into half-inch lengths by the gypsum producer.

The foam-rubber industry is evaluating the use of milled Fiberglas fibers as a reinforcement. The fibers are prepared by hammer-milling continuous glass yarns through an eighth-inch screen. It is claimed that the addition of one to ten percent by weight of milled fiber to rubber latex has resulted in a cured foam with increased tensile strength, compressibility, and density, as well as markedly reducing the tendency of the foam to shrink during cure.

A new type of tying twine, constructed of Kraft paper twisted around a core of asphalt-coated Fiberglas yarn, has met a series of laboratory tests and has been put on the market. Developed for the same general wrapping and packaging applications as polished cotton twine, the new twine offers equal uniformity of strength and far less stretch than cotton. Standard twine-making equipment is used for manufacturing.

These products have joined a Fiberglas textile family of great multiplicity, which include Fiberglas-reinforced papers and tapes, steam hose, hot-materials conveyor belts, coated fabrics and vinyl films.

Applications seem to be limited only by the limits of time and man's imagination and vision.

Western New England Section——

SURFACE-ACTIVE AGENTS AND THEIR FAR-REACHING INFLUENCE IN THE TEXTILE INDUSTRY*

P J SULLIVAN

Detergent Sales Department, National Aniline Division, Allied Chemical and Dye Corporation
New York, N Y

The present paper covers the specific applications of synthetic detergents in textile processing in considerable detail.

The textile industry was among the first to recognize the advantages offered by surface-active agents in the wet processing of wool, cotton, rayon, or acetate and later the newer fibers and blends of fibers which have come into prominence. The result has been a noteworthy contribution toward better fabrics, newer processing methods, and lower processing costs than would otherwise be possible.

In addition to the textile field many of the modern advantages which we enjoy today are the result of one or more contributions of that portion of the synthetic organic chemical industry engaged in the manufacture of surface-active agents. The phenomenal growth of this industry covers a span of less than a quarter of a century and, in fact, its upward surge actually began less than ten years ago. By virtue of their physical and chemical properties, surface-active agents lend themselves to a vast number of miscellaneous applications, only a few of which are mentioned here.

HISTORICAL

SURFACE-ACTIVE agents today are readily accepted and used both for industrial and domestic purposes. We might even say that they are becoming so commonplace in our everyday existence that we tend to overlook the benefits which all of us share as a result of their development. History records efforts by chemists early in the nineteenth century to synthesize the ideal detergent. Soap, of course, has been the universal surface-active agent for centuries. It wets, emulsifies, and cleans, and normally it is inexpensive and in ample supply. However, the same shortcomings with which we are all familiar prompted these early chemists to seek new products possessing all of the good qualities of soap yet remain stable in mild acid solutions and in the presence of lime and magnesium salts in hard water. The first major step in this direction was the sulfonation of oils—whale oil, cocoanut oil, castor oil, etc. These sulfonated oils functioned much better than soap in acid, alkaline, and hard-water solutions but were inferior in detergency. Furthermore, being derived from more expensive raw materials their market price was higher than soap and thus limited their use.

It is said that necessity is the mother of invention, and it was necessity that inspired German chemists to renew earlier efforts to produce a synthetic detergent. Supplies of fats and oils for soap making dwindled rapidly during the early days of World War I, and it became imperative that suitable replacements for soap be found. They were successful in producing a reasonably good substitute, which carried them through the war and postwar adjustment period. It was not until the late 1920's, however, that any sizeable development took place in this new industry. Most of the products offered at that time were based on animal or vegetable oils and were therefore expensive. This naturally limited their use in spite of the obvious advantages which they offered. The need for an efficient low-cost synthetic detergent, particularly in the textile field, prompted research by the National Aniline Division of the Allied Chemical and Dye Corporation on the development of such a product from inexpensive and abundant petroleum hydrocarbons. These research chemists were intimately familiar with this field through years of coal-tar dyestuffs research and development. Coupled with a widespread knowledge of the problems and needs of the textile industry, it was only natural for National Aniline to embark on a program, which resulted in the perfection of a series of synthetic detergents produced under the trade name "Nacconol".[1] This was truly the first low-cost synthetic detergent, and its balanced properties and ability to do more than soap in many applications hastened its widespread use. This set up a chain reaction whereby ever-increasing consumption reduced manufacturing costs, which in turn meant lower selling prices, and this fostered still wider application. Increased use in turn aroused the interest of others to undertake the mass production of synthetic detergents.

All of this took place in the 1930's and early 1940's, and it was during this period that the synthetic-detergent industry gained importance. By 1942 great strides had been made in developing new products and in improving the quality of existing ones. The demands of the war years in the face of vastly reduced supplies of animal and vegetable fats for soap making placed a tremendous burden on the existing facilities of the new industry. It was fortunate, however, that the pioneering phase of this development had taken place during the between-war interval and that the industry had grown to a point where it could assume the responsibility.

In the immediate postwar period, as you may recall, soap was still in short supply and that which was available was very high in price. This spurred the interest of many in synthetic detergents, since their price had advanced little, if at all, during this period. Today their place is firmly established, and the industry has expanded well beyond the most optimistic predictions made in 1946. The following table illustrates this expansion:

Period	*Domestic Production of Synthetic Detergents millions of pounds*
1939	100
1944	200
1949	875
1951	1490
1953	1900 (estimated)

The above estimate for the current year is based on a report covering the first six months' period, which shows synthetic detergent sales in excess of 900 million pounds. It is interesting to note also that the same report shows total sales of synthetic detergents exceeding total sales of soap for the first time in history. This tremendous development in the course of a few years is the result of the combined efforts of chemical research, engineering, production, technical service, advertising, and in particular the marketing and vast sales capacity of the soap and detergent industry.

There are now hundreds of compounds classified as surface-active agents—anionic, nonionic, or cationic—by virtue of their physical and chemical properties. Of this

* Presented at Rapp's Café in Shelton, Conn, on Friday evening, Dec 11, 1953. Submitted to the Reporter by the Editor of Proceedings on April 5, 1954.

[1] Trademark "Nacconol" registered by the Allied Chemical & Dye Corporation in the U S Patent Office.

large number, only a comparatively few possess sufficient cleaning power to be classified as synthetic detergents. A lesser number combine wetting ability, emulsification, and suspending power with the ability to remove particles of soil from the surface to which they are attached. Such a product represents the balanced detergent—the best combination of all of these properties.

USES OF SYNTHETIC DETERGENTS

The textile industry was among the first to recognize the advantages offered by synthetic detergents, and it is interesting to note that synthetic detergents were first primarily produced for the textile industry by the dyestuff manufacturers, who were keenly aware of the dyers' problems. Many of these problems were caused by conditions developed in scouring and resulted in redyes and rejected fabrics. This naturally was a tremendous loss to the industry both in time and money. Proper use of synthetic detergents helped to overcome this condition since most of those products are readily soluble, have good to excellent wetting properties, are stable over a wide pH range and in the presence of metallic salts, and are easily rinsed from the fiber. They have therefore found a place in almost every wet-processing operation.

SCOURING WOOL ——— Although raw wool may not present the most difficult scouring problem, it is generally agreed that it is the dirtiest fiber to process. Synthetic detergents are of course widely used for wool scouring and particularly for pulled wools where advantage is taken of their stability in the presence of calcium salts. Without going into detail on scouring formulas at this time, it is sufficient to say that, in the average four- or five-bowl train having two scouring bowls, the initial concentration of a 40% alkylarylsulfonate such as Nacconol NR or Nacconol DB would be in the range of 0.15% to 0.20% based on weight of solution (ours). Initial concentration should be maintained by periodic additions or by a continuous feed of stock solution. It has been found in actual practice that, from the standpoint of grease removal, the most efficient scouring is obtained when the pH of the first scouring bowl is maintained within the range of 10.5 to 11.0. It has also been demonstrated that acidic materials carried into the first scouring bowl convert sodium carbonate to bicarbonate. This results in a depression of pH to the range of 8.0 to 8.5, which in turn produces an increase in the residual grease content. This build-up of bicarbonate during scouring can be effectively controlled by the periodic addition or constant feed of mildly causticized soda-ash solution prepared on the basis of one pound of flake caustic for each ten pounds of soda ash. Scouring-bowl temperatures, of course, should be maintained at 110 to 130° F with an average of about 120°F being quite common. In handling mohair, alpaca, cashmere, and other hair fibers, modifications in the procedure are necessary in keeping with the particular conditions involved.

FULLING ——— In alkaline fulling, synthetic detergents for the most part are used in conjunction with a suitable soap in order that the best properties of each may be utilized. An alkylarylsulfonate of the Nacconol NR type serves best as a 25 to 30% replacement for soap in the formula. The synthetic detergent provides rapid and even distribution of the fulling solution throughout the fabric and subsequently provides thorough and rapid removal in rinsing. In some instances where the fulling period is relatively short, a synthetic detergent alone plus a suitable builder such as soda ash is quite satisfactory. Certain chemical types of synthetic detergents have proved to be acceptable for extended fulling periods on medium-weight fabrics and are being used in so-called short-cut procedures where the cloth is carbonized in "the grease", following which neutralizing and fulling are accomplished successively in the fulling mill. Under some conditions and with suitable equipment acid fulling is desirable, and the advent of acid-stable synthetic detergents aroused new interest in this method since subsequent scouring can be carried out in the presence of the acid thereby eliminating the necessity for neutralizing.

MISCELLANEOUS USES FOR WOOL ———Throughout the wet processing of woolen and worsted yarn, top, or fabric there are numerous operations where advantage can be taken of one or more of the physical or chemical properties of synthetic detergents. These include the backwashing of top, the scouring of knitting yarns and carpet yarns as skeins in Klauder-Weldon or Knowles-type machines, the scouring of yarn in package form in conventional equipment, and the scouring of piece goods in dolly washers or by continuous scouring methods. The ease with which a synthetic detergent can be rinsed from the fiber at low temperatures is economical in both batch and continuous processes. In the dolly washer rinsing time and water temperature can usually be kept at a minimum. This means increased production from the equipment plus a saving in the cost of supplying hot water for this purpose. The same applies to the continuous scouring of piece goods, in which case output of the machine is often geared to its ability to deliver cloth essentially free of residual soap and alkali. The rapid and complete removal of a synthetic and its faculty for carrying with it much of the residual alkali makes it possible to increase the rate of production. Furthermore, it is now a well established fact that, when the oil to be removed from the yarn or fabric is of a mineral nature, a combination of a synthetic detergent like Nacconol plus common salt is far more effective in reducing residual oil content of the yarn or cloth to an acceptable minimum than the same detergent built with an alkali such as soda ash. Of course, when saponifiable oils are present this does not necessarily hold true. In any event, it is significant to note also that, when synthetic detergents are used, it seldom makes any difference whether or not the detergent itself is completely rinsed out. Usually if the cloth is to be dyed, it is advantageous to leave in a slight amount to serve as a rewetting agent in the dye kettle. This leads us to another use for the surface active agent —as a dyebath assistant. Many of these products serve to wet out the fibers rapidly and uniformly and subsequently assist in promoting level dyeing.

No attempt will be made at this time to include the numerous special conditions and situations where synthetic detergents have made possible a better fabric, a lower-cost operation, or have solved a problem in a simple efficient manner. As an example we point to the case of the fabric which contained an aluminum thread for decorative effect. In regular alkaline scouring the thread was dissolved and the entire effect lost. A neutral scour with a detergent of the Nacconol type plus common salt promptly solved the problem.

PROCESSING COTTON———In spite of all the new fiber developments cotton is still king. However, it is a long way from the field to the finished fabric and much depends upon the proper use of detergents in transforming raw cotton to an acceptable yarn or cloth. Synthetic detergents have not changed to any appreciable degree the basic cleaning processes, but they have definitely contributed toward improving them. Increased production with existing equipment and greater economies in the use of chemicals are the constant objectives in any wet-processing operation, but this is particularly true in the case of cotton where competition is especially keen. As was pointed out in discussing the application of synthetic detergents to various phases of wool processing, the cotton-bleaching, -dyeing, and -finishing industry also recognized such characteristics of

these products as their stability in hard water, solubility at low temperatures, and ease of rinsibility.

Possibly the first step in the wet processing of cotton cloth where they perform a service is in desizing. A very small quantity of a suitable detergent accelerates the action of the enzyme, and, in the case of heavy fabrics, it acts as a penetrating agent to carry the enzyme into the cloth. Some surface-active agents, however, interfere with enzyme action rather than accelerate it. This must be kept in mind when selecting a product for this purpose.

Although the kier is giving way to the continuous bleach range, there are still many kiers in use. Progressive organizations have found that, with the proper amount of synthetic detergent present, the normal quantity of caustic soda can be reduced by 25 to 30% and boiling time to approximately the same degree dependent, of course, upon the type of fabric and other controlling factors. The synthetic detergent assists the caustic in penetrating the natural protective coating on the fiber and, after removal, keeps the waxes, pectins, and other foreign matter emulsified or in suspension as the case may be. As a result the cloth is in a cleaner condition for bleaching. It follows then that bleach requirements may be reduced resulting not only in a saving of supplies but also in providing a safety factor against overbleaching or the formation of oxycellulose. The same factors are evident in the transformation to continuous processes. A constant feed of a synthetic detergent solution to the caustic saturator assists in the removal of natural waxes and pectins and, as in the case of kier methods, improves the condition of the cloth as it passes on to the bleaching operation. Care must be taken, however, to avoid excessive use of the synthetic at this point. Failure to do so may result in the generation of more foam than can be tolerated. Of more importance is the controlled addition of synthetic detergent to the peroxide saturator. In this instance the detergent provides more rapid and intimate contact of the peroxide with the fiber, thereby permitting it to perform its function of bleaching before being otherwise expended. From the dyer's standpoint the net result of these over-all benefits is reflected in the improved condition of the fabric as he receives it for dyeing.

The same general advantages which have already been mentioned apply likewise to batch bleaching with peroxide and to batch or semicontinuous methods with hypochlorite. Good control is essential in using hypochlorite if the undesireable formation of oxycellulose is to be avoided. A very small amount—0.1% or less on weight of fiber—of a detergent such as Nacconol makes possible a considerable reduction in hypochlorite requirements without impairing the efficiency of the bleaching action. This serves as a safety factor against the tendering of fabric.

Without going into too much detail it is sufficient to point out that synthetic detergents have an active part in almost all phases of dyeing, whether it be concerned with raw stock, yarn, or fabric. They may serve as wetting agents to insure even take-up of the dye liquor, as penetrants to carry the dye into the fiber, as leveling agents for uniform dye distribution, and as detergents for the removal of excess color on vat- and naphthol-dyed piece goods and prints. It is generally conceded that naphthol colors as a group are more susceptible to crocking than others and the manner of washing has a definite influence on crocking tendencies. Experience has shown that there is a definite reduction in both wet and dry crocking when a solution containing a detergent such as Nacconol plus sodium chloride or sulfate is used. Reports indicate that, in some cases, best results are obtained when salt is replaced by acetic acid.

It is evident from what has been said here that in every step in the wet processing of cotton from the raw fiber to the finished fabric synthetic detergents have contributed toward the improvement of processing methods, the reduction of costs, the betterment of fabrics themselves, or a combination of all of these factors.

SYNTHETIC FIBERS ——— The development of synthetic fibers and synthetic detergents has gone more or less hand in hand over the past twenty-five years. It is true that the original fibers were marketed earlier than the detergents and therefore had reached a much greater sales volume by the end of World War II. Since that time, however, the detergents have developed at a much greater rate from a production standpoint so that now they have reached approximately the same level. It is not surprising then that they have been used in all phases of synthetic-fiber processing from the viscose spin bath to the washing of vat and naphthol prints.

Generally speaking the scouring of rayon piece goods does not present any great detergency problems. Synthetic detergents alone or in combination with mild alkalis have served adequately for this purpose. Obviously the wide variety of fabric constructions makes certain precautions necessary in the handling of these materials to prevent crease marks and other defects. Care must be taken to keep the pH reasonably near the neutral point to avoid saponification in scouring acetate fabrics and those containing acetate in the blend or in decorative effects.

The scouring of nylon may be handled by batch or continuous methods with a synthetic detergent plus soda ash, trisodium phosphate, or other suitable builder. Fibers, such as Dacron, Orlon, Acrilan, Dynel, etc, are also being scoured satisfactorily with synthetic detergents, often in a neutral bath. Blended fabrics too may be added to the list. Since many of these blends contain wool, fiber lubricants must be removed. The same principles apply here as in the case of an all-wool fabric.

NONTEXTILE APPLICATIONS——— Surface-active agents as a group and by virtue of their physical and chemical properties lend themselves to a vast number of miscellaneous applications. They contribute directly or indirectly to many of the modern advantages which we all enjoy today. Improved sanitation in the dairy, poultry, and meat industries insures us of better food products than were obtainable a quarter of a century ago. Packaged fruits and vegetables are more attractive, more sanitary, and have better keeping qualities when washed with synthetic detergents prior to delivery to the market. Synthetic detergents have replaced coconut oil in Army and Navy specifications for sea-water soaps. Bubble-bath preparations, shampoos, and many other items classified in the cosmetic category are based wholly or partially on synthetic detergents.

Products for industrial sanitation and building maintenance, such as floor cleaners, self polishing waxes, metal polishes, etc, contain synthetic detergents. They are also used extensively in both acid and alkaline metal cleaners and as antipitting agents in electroplating. Many of the modern superhighways are constructed of cement containing a surface-active agent for air entrainment. Air entrained cement as compared with regular cement is stronger and more resistant to surface scaling when subjected to wide variations in temperature. One of the most important items in the formulation of so-called water-base or rubber-base paints, which have become so popular in the past three or four years, is the surface-active agent which acts as an emulsifier for the copolymer latex base and as a disperser for the pigment. By introducing millions of air cells through their foaming action synthetic detergents enable manufacturers to produce gypsum board that is much stronger and considerably lighter in weight than would otherwise be possible. In coal-producing areas the safety of workers has been greatly improved since surface-active agents have been applied successfully for the suppression of dust in the mines. For some time the paper industry has made use of these products to promote absorbency in cleaning tissues, blotting papers, and paper

towels; for the deinking of waste paper; and for the washing of machine felts. Within the past few months developments in the fertilizer industry indicate that synthetic detergents added in the mixing of the various components reduce the tendency for the fertilizer to form hard lumps after bagging, thereby making distribution in the field easier for the farmer. Numerous other applications of surface-active agents could be added to those already mentioned, and all contribute their share in one way or another toward a better way of life for everyone.

This brief review includes only the major uses of synthetic detergents in the textile industry. If time would permit, a vast number of more or less specialized uses for these detergents in textile processing could be discussed. Such a list would include—just to name a few—the scouring and dyeing of pile fabrics, corduroys, laces, hosiery, wool hat bodies, industrial felts, and many more. We see then that surface-active agents enter into almost every phase of the wet processing of textiles and by doing so have assisted in making possible the great progress which this industry has shown in the past quarter of a century.

Membership Applications

April 26, 1954

SENIOR

Sidney D Barlow—Vice-pres & chemist, Mark-Tex Corp, New York, N Y. Sponsors: C Minoff, S Monroe.

Albert W Bauer—Research chemist, Jackson Lab, E I duPont de Nemours & Co, Inc, Deepwater, N J. Sponsors: S H Boyd, Jr, H P Landerl.

Clarence A Bester—Chief chemist, director, Independent Tech Service, Inc, St Louis, Mo. Sponsors: M E S Metze, E D Roseberry.

Edmund D Desmond—Technical director, Dyecraftsmen, Inc, Hingham, Mass. Sponsors: A W Mack, W B Luce.

Rodger S Furey—Supt of dyeing, Dyecraftsmen, Inc, Hingham, Mass. Sponsors: A W Mack, W B Luce.

Bennett S Germer—Assist supt, Dyecraftsmen, Inc, Hingham, Mass. Sponsors: A W Mack, W B Luce.

Fred L Hunter—Overseer, raw stock & scatter rug dyeing, Callaway Mills Co, Valway Plant, H D V Division, LaGrange, Ga. Sponsors: W B Griffin, J M Goldston.

Philip M Luce—Production finishing dyed nylon hosiery, Chipman Knitting Mills, New York, N Y. Sponsors: J E Laughlin, W M Ralph.

Willard F Spengeman—Pigment chemist, E I duPont de Nemours & Co, Inc, Newark, N J. Sponsors: C K Black, C A Sylvester.

Richard J Tryanna—Foreman dyer, Mohawk Carpet Mills, Inc, Amsterdam, N Y. Sponsors: R W Pallen, D Reisigl.

Max-Rudolph Wirth—General mill-manager, Farberei & Appretur Schusterinsel, Weil, Rhein, Germany. Sponsors: W G Helmus, H Moore.

JUNIOR

Jerome S Cohen—Textile converter, William Teres Co, Inc, New York, N Y. Sponsors: E N Steiner, E H Staab.

ASSOCIATE

Glenn P Martin — Foreman of dyeing, Tenn Tufting Co, Nashville, Tenn.

STUDENT

Damiano E Caramanto — Rhode Island School of Design. Sponsor: H B Sturtevant.

Robert E Winn — Georgia Institute of Technology. Sponsor: W M Postman.

CORPORATE

The Goodyear Tire & Rubber Company, Inc.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Daniel F Callahan

May 7, 1954

SENIOR

Ralph J Asbill—Foreman, piece dyeing, Aileen Mills Co, Biscoe, N C. Sponsors: W L Barker, W F Harrison, Jr.

Albert F Baker — Overseer, dyeing & bleaching, Mooresville Mills, Mooresville, N C. Sponsors: J H Troutman, R H Baker, Jr.

Gian C Campari—General manager, Societa Italiana Colori Affini, Milan, Italy. Sponsors: E M May, D B Ekstrom, Jr.

Warren A Fisher—Hosiery dyer, dyehouse foreman, W G Leininger Knitting Co, Mohnton, Pa. Sponsors: A E Koch, C I Ruth, Sr.

Robert A Gilliam—Div mgr, Finishing Div, Burlington Mills Corp, Greensboro, N C. Sponsors: C Hooper, W B Sellars.

John B Gregory—Partner & director of research on rubber & plastics, Frederick S Bacon Labs, Watertown, Mass.

Herbert L Jones, Jr—Research engineer, American Pad & Textile Co, Greenfield, O. Sponsors: J G Stott, J Nerl.

Clarence S McCrorey—Salesman, Verona Dyestuffs, Rock Hill, S C. Sponsors: R S Spencer, W P Clement.

Norman E Perra — Chemist, Guilford Woolen Mill, Guilford, Me. Sponsors: T P Seney, S P Sweatt.

E Grady Reep—Quality control engineer, Southern Mills, Inc, Atlanta, Ga. Sponsors: J L Taylor, W Postman.

Michael D Rufty—Hosiery dyer, Catawba Hosiery Mills, Inc, Catawba, N C. Sponsors: J C Steele, J B Foster, Jr.

Victor D Stibolt—Customer service rep, Textile Fibers Dept, E I duPont de Nemours & Co, Inc, Wilmington, Del. Sponsors: P DeMallie, M W Goodell.

Frederick F Ungar — Industrial chemist, Ossining, N Y. Sponsors: G G Neisser, P J Choquette.

William H White—Service Lab, Althouse Chemical Co, Inc, Reading, Pa. Sponsors: J W Auman, H C Gift.

JUNIOR

Russell C Lakey — Sales representative, Nopco Chemical Co, Harrison, N J. Sponsors: J F Cairns, M J Blackwood.

Harry J Morton — Fabric development technician, E I duPont de Nemours & Co, Inc, Wilmington, Del. Sponsors: M K Ryan, Jr, D H Haigh.

ASSOCIATE

Shigeyoshi Inoue—Dyeing & finishing engineer, Toyo Spinning Co, Osaka Dyeing Factory, Osaka, Japan.

Nicholas A Mignone—Executive, Camden Florist Supply Co, Inc, Camden, N J.

Morgan C Plummer—Technical rep for intermediate sales, Monsanto Chem Co, St Louis, Mo.

STUDENT

Nancy J Geary—Lowell Tech Inst. Sponsor: E E Fickett.

Roger E Rondeau—Lowell Tech Inst. Sponsor: E E Fickett.

Robert C Schiek—Lowell Tech Inst. Sponsor: E E Fickett.

Harry N Tobler — Lowell Tech Inst. Sponsor: E E Fickett.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Earl Holt
Meta E S Metze

CORPORATE

Aldon Rug Mills, Inc

1953 Annual Convention——Textile Auxiliaries Group——

ADSORPTION OF DETERGENT IN THE DYEING PROCESS*

LAWRENCE FLETT and L F HOYT

New Products Division, National Aniline Division
Allied Chemical & Dye Corporation, New York, N Y

INTRODUCTION

THE effect of various alkyl sulfates, alkyl sulfonates, and other surface-active agents on the dyeing of textile fibers has been known practically since their earliest discovery and their earliest use. In fact, it is in the textile industry that surface-active agents found their first important use and complete development.

It is well known that the surface-active agents could be used to bring about more level dyeing, that they tend to retard the dyeing process and sometimes even inhibit the dyeing process. Various theories have been advanced to explain the effect of the surface-active agents. Since it is well known that surface-active agents are adsorbed by textile fibers, it has been the concensus of opinion that the adsorbed surface-active agent was responsible for the various effects encountered in the dyeing operation.

In a paper by the authors *(1)* it was shown that quantitative measurements could be made of the adsorption of the surface-active agent, Nacconol NR.† The amount of detergent adsorbed will vary with different types of fiber and even with the different lots of cloth, and it will vary with substantially every physical condition involved in the treatment by the detergent solution. With a given piece of cloth and under given conditions, however, quite accurate values for the amount of adsorption can be obtained. The extent and the rapidity with which anionic surface-active agents are adsorbed, under dyeing conditions, particularly on natural nitrogenous fibers may not be fully realized.

In order to understand better the effect of adsorption on the dyeing process, a study has been made of the adsorption of a detergent under conditions encountered in the dyeing process to determine if the adsorbed surface-active agent was possibly displaced by the dyestuff.

The method of determining the detergent content was a modification of the method of Barr, Oliver and Stubbings *(2)*, used in our previous work. In order to use this method effectively, it was desirable to use a simple dyestuff and to modify somewhat the method of analysis. The dyestuff used, chosen because of its simple structure and ease of handling, was National Wool Orange A Conc, CI 151. Studies reported in this paper have been confined to wool, for which surface-active agents have a particular affinity.

L F Hoyt

It is well known that surface-active agents used for leveling dyestuffs tend to retard the dyeing process. This is explained by several different theories, one of which assumes that there is a competition between the dyestuff and the detergent for particular positions with respect to the molecules which make up the fibers.

Tests were run to determine quantitatively the amount of synthetic detergent adsorbed on wool at different stages in the dyeing process. Tests were made in which the detergent was applied to the wool before it was dyed, where both the detergent and dye were used together and where the wool was dyed and then treated with the synthetic detergent.

EXPERIMENTAL

Weighed samples of wool, Botany carbonized wool flannel #405, were dyed with Wool Orange A and with and without Nacconol NR at 180°F for varying periods of time in dye baths containing the usual amounts of Glauber salt and acid. Strong dyeings were made, and excessive amounts of Nacconol NR were used to accentuate the effects. All dyeings were carried out in closed Inconel containers of 1100-ml capacity in a Launder-Ometer operated at 42 rpm. The amounts of dye and of Nacconol NR remaining in the dye liquors were determined by analysis.

METHODS OF ANALYSIS——Small amounts of anionic detergents can be determined with a high degree of accuracy by the method of Barr, Oliver and Stubbings. In this method a dilute solution, approximately 0.001 molal, of a suitable cationic detergent such as Hyamine #1622 is used to titrate the anionic detergent in a 2-phase system of water and chloroform. The indicator normally used is 0.50 ml of a 0.04% solution of bromphenol blue. This dye is soluble in water but insoluble in chloroform; however, it forms a blue complex with a cationic detergent, and this blue complex is soluble in chloroform. When the cationic detergent has reacted quantitatively with the anionic detergent, as little as 0.05 ml of a 0.001 molal solution will form the chloroform soluble colored complex with the indicator, which imparts a bluish-green tint to the chloroform.

The authors have found that Hyamine #1622 may also be reacted quantitatively with Wool Orange A to form a chloroform-soluble complex, similar in shade to the water solution. The endpoint of this titration is, in effect, the complete migration of the orange colored complex into the chloroform.

Since the final stage of this endpoint is difficult to observe, we have found it expedient to modify the usual procedure by titrating with the Hyamine #1622 cationic solution until nearly all of the color has transferred to the chloroform. Then this chloroform, now deeply orange-colored, is discarded, replaced with fresh chloroform, the usual amount of bromphenol blue indicator is added, and the titration completed. The migration of the bromphenol blue complex into the fresh chloroform, now weakly orange-tinted, is easily seen.

If a synthetic detergent, such as Nacconol NR, is also present along with some Wool Orange A, both sulfonates react with the cationic detergent and there is no trouble in obtaining a sharp endpoint. Since Wool Orange A in solution can be determined spectrographically with considerable accuracy, and since both Nacconol NR and Wool Orange A react quantitatively with Hyamine #1622, it is possible to determine the Nacconol NR

* Presented by L F Hoyt in the West Ballroom of the Conrad Hilton Hotel in Chicago on Friday afternoon, Sept 18, 1953, before the session on Textile Auxiliaries with N A Ruston presiding. Submitted to the Reporter by the Editor of Proceedings on March 29, 1954.

† Trademark "Nacconol" Reg U S Pat Off, Allied Chemical & Dye Corp.

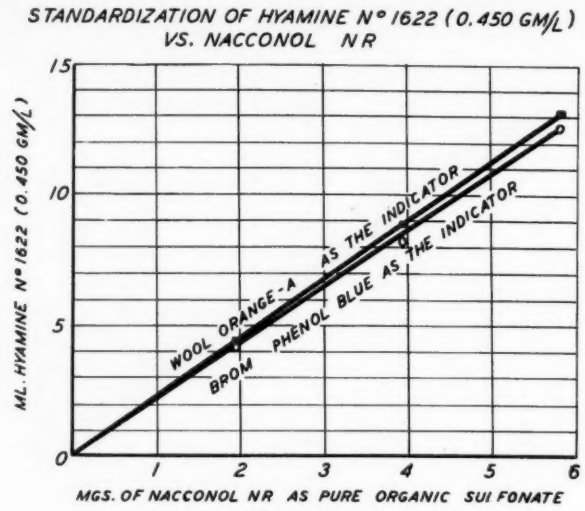


Figure 1

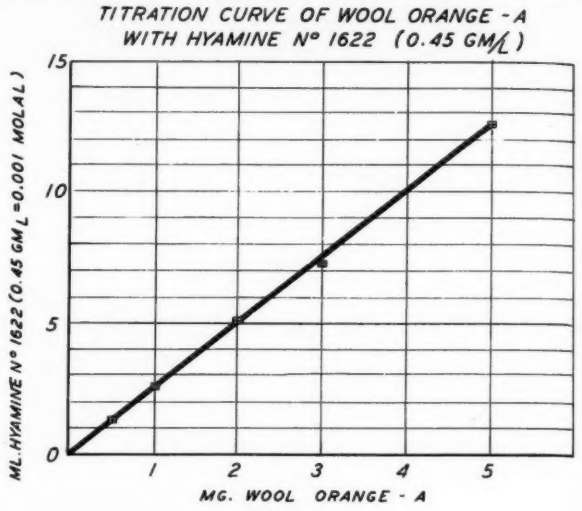


Figure 2

quantitatively in the presence of Wool Orange A by subtraction.

A solution of 0.450 grams per liter of Hyamine #1622 has been found to have the following equivalents:

1 ml = 1.022 mg of Nacconol NR containing 43.4% active organic sulfonate

1 ml = 0.40 mg Wool Orange A Conc of standard strength.

The titration of known amounts of Nacconol NR and of Wool Orange A with Hyamine #1622 with bromphenol blue as indicator gives smooth curves, as shown in Figs 1 and 2.

Since the endpoint of the titration of either Nacconol NR or Wool Orange A can be determined with 0.1 ml of cationic solution, the sensitivity of the method is 0.1 milligram of Nacconol NR or 0.04 milligram of Wool Orange A in whatever weight of sample may be contained in the 100-ml aqueous layer being analyzed. In our studies this degree of sensitivity translated into an accuracy of about 1 part in 1000 for Nacconol NR or 1 part in 625 for Wool Orange A on the basis of the amounts initially present in the dye liquors.

RESULTS —— The first study of detergent adsorption in the dyeing of Wool Orange A was a time study to determine the rate of adsorption of Wool Orange A and Nacconol NR when used together, as compared to the rate of adsorption when the Wool Orange A or the Nacconol NR were used alone. The study was run over periods of one minute to two hours. Results are set forth in Table I. Impressive is the 80% adsorption which takes place in the first minute. After 30 minutes, the adsorption process is substantially complete.

When Nacconol NR and Wool Orange A are used in the same bath, the amount of residual dye and residual detergent in solution is substantially double that which is present when the products are used alone. Both the detergent sulfonate and the dye sulfonate tend to increase the amount of the other sulfonate in solution.

The results given in Table I are shown graphically in Figs 3 and 4. Most interesting from the standpoint of past theories is the fact that, whether the dye and detergent are used alone or together,

TABLE I

ADSORPTION OF SULFONATES ON WOOL

Residual Dye and Nacconol NR after Adsorption of Wool Orange A and Nacconol NR on Wool, Separately and Together, under Dyeing Conditions.

	A, Wool Orange A 200 mg		*B*, Nacconol NR 800 mg	*C*, Wool Orange A, 200 mg Nacconol NR, 800 mg	
Elapsed Time Minutes	*Residual Dye % of Total*		*Residual Nacconol NR*	*Residuals % of Total*	
	by Spectroscopy	*by Titration*	*% of Total by Titration*	*Dye by Spectro*	*Nacconol NR by Titration*
1	19.3	20.40	17.14	33.2	29.50
5	11.2	12.48	5.07	14.5	11.98
15	9.0	9.96	2.76	11.9	7.30
30	3.8	3.80	2.53	7.8	3.22
60	3.0	3.05	1.80	7.7	2.93
120	3.0	2.95	1.84	7.2	2.76

General Exptl Conditions:
10 g wool in 400 ml of soln (1:40 liquor ratio)
1 g Glauber's salt (10% owf); 0.1 g sulfuric acid, 56% (1% owf)
0.5 g acetic acid, 28% (5% owf); temperature, 180°F

TABLE II

DESORPTION OF DYE FROM WOOL BY PRESENCE OF NACCONOL NR

Experiment:
10 grams wool was dyed 1 hour at 180°F with 2% Wool Orange A (200 mg); then 8% dry Nacconol NR (800 mg) was added to the *same* bath and treatment was continued for another hour at 180°F.

	% Dye		*% Nacconol NR*	
	Residual	*Adsorbed*	*Residual*	*Adsorbed*
1 hour dyeing	3.0	97.0	—	—
8% Nacconol NR added for 2nd hour	8.8	91.2	4.14	95.86

Experiment:
10 grams wool was treated 1 hour at 180°F with 8% Nacconol NR (800 mg); then 2% (200 mg) dry Wool Orange A was added to the *same* bath and dyeing was continued for another hour at 180°F.

	% Dye		*% Nacconol NR*	
	Residual	*Adsorbed*	*Residual*	*Adsorbed*
1 hour treatment	—	—	1.80	98.20
2% Wool Orange A	8.2	91.8	3.05	96.85

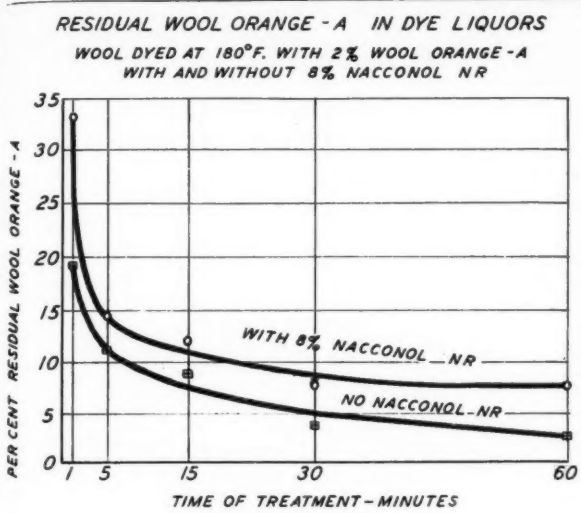

RESIDUAL WOOL ORANGE - A IN DYE LIQUORS
WOOL DYED AT 180°F. WITH 2% WOOL ORANGE - A
WITH AND WITHOUT 8% NACCONOL NR
PER CENT RESIDUAL WOOL ORANGE - A
WITH 8% NACCONOL - NR
NO NACCONOL - NR
TIME OF TREATMENT - MINUTES

Figure 3

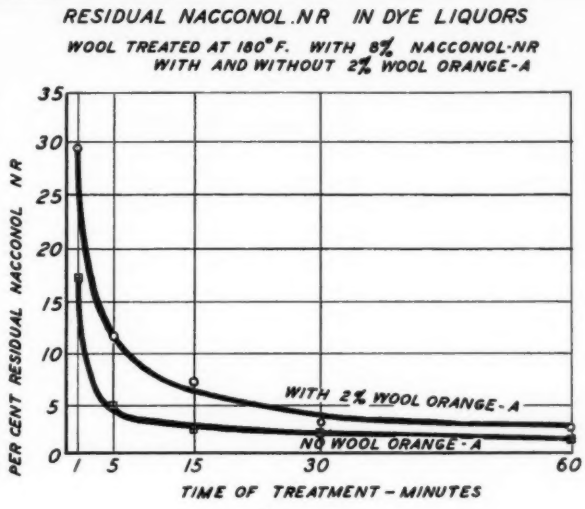

RESIDUAL NACCONOL NR IN DYE LIQUORS
WOOL TREATED AT 180°F. WITH 8% NACCONOL-NR
WITH AND WITHOUT 2% WOOL ORANGE-A
PER CENT RESIDUAL NACCONOL NR
WITH 2% WOOL ORANGE - A
NO WOOL ORANGE - A
TIME OF TREATMENT - MINUTES

Figure 4

92 to 98% of both the dye and detergent are adsorbed.

The results given in the first test were run under conditions where both products were present in the bath from the start. It became of interest to determine whether the effect was one which took place only during the dyeing operation or whether it was an effect which more nearly represented an equilibrium condition. In order to show this, the Nacconol NR and Wool Orange A were adsorbed on the wool by a one-hour treatment, after which the detergent was added to the dyestuff solution and the dyestuff was added to the detergent solution and the treatment was continued for another hour at 180°F to approximate the conditions encountered at the end of the two-hour period in the previous table.

The results of this test are shown in Table II. Adsorbed dye at the end of the second hour, after the Nacconol NR had been present for one hour, was 91.2%, which compares quite favorably with the value of 92.8%, shown at the end of the second hour when both the detergent and dye were originally present, as shown in Table I. The amount of adsorbed dye was substantially the same where the dye was added after the wool had been treated with the detergent solution for one hour.

In the case of the Nacconol NR, the adsorption at the end of the second hour in the case where the detergent was used alone for the first hour was about 96%, as compared with about 97% where both were present at the start, as shown in Table I. Where the Nacconol was first added and then the dyestuff, the results are almost a perfect check of the results in Table I. This desorption effect was further checked by experiments in which the dyed cloth was removed from the dye solution and entered into fresh solution. Tests were made with both distilled water and water containing the same amount of Glauber salt and acid as was used in the original dyeing. The results of this test are shown in Table III. When the dyed fabric was heated in distilled water for one hour, only 2% of the dye on the fabric went into solution. Where 8% of Nacconol NR owf (on wt of fiber) was added to the distilled water, 24% of the dye came into solution. However, if the fresh solution contained the same amount of Glauber salt and acid as the original dye solution, the adsorption was 93.4%, which is close to the values obtained in the two previous tests.

A final test was made to make sure that the capacity of the wool to adsorb the sulfonates was not being approached. In this test, the amount of dyestuff was doubled and the amount of detergent was reduced to half. Results are set forth in Table IV.

During a dyeing of wool with Wool Orange A under normal conditions, as shown in the previous tables, 3% of the total dye was left in solution and un-

TABLE III

WOOL, DYED WITH 2% WOOL ORANGE A WITHOUT NACCONOL NR

Notes: Values for a, b, and c were corrected for the drag-out of Wool Orange A from the spent dye bath.
The wool (15 g) for this expt was dyed with 2% Wool Orange A owf for 1 hour at 180°F in a 1:40 liquor (600 ml) in the presence of the same percentages of assistants as in Table I but with no Nacconol NR in the bath.

	% Residuals in Spent Liquors	
	Dye	Nacconol NR
Control, 2% Wool Orange A	5.8	—
Subsequent treatments of 5.0-gram pieces of dyed wool, 1 hour more at 180°F in 200-ml baths.		
(a) Distilled water only	2.0	—
(b) 8% (400 mg) Nacconol NR in distilled water no Glauber salt or acid added	24.0	11.4
(c) 8% Nacconol NR in fresh bath containing Glauber's salt and acid	6.6	2.7

TABLE IV

EFFECT OF VARYING PERCENTAGES OF ADSORBED SUBSTANCES ON ADSORPTION

General Expt'l Conditions:
10g wool in 400 ml of soln (1:40 liquor ratio)
1g Glauber's salt (10% owf); 0.1 g sulfuric acid, 56% (1% owf)
0.5g acetic acid, 28% (5% owf); 1 hour at 180°F

Substances Used For Adsorption % owf		Percent of Total Absorbed on Wool		Percent Residuals in Spent Liquors	
Wool Orange A	Nacconol NR	Dye	Nacconol	Dye	Nacconol
2	0	97.0	—	3.0	—
2	4	94.3	98.1	5.7	1.9
2	8	92.2	96.8	7.8	3.2
4	8	81.3	94.6	18.7	5.4

adsorbed. When 8% of Nacconol NR owf was added (the amount used in previous tables) this residual amount in solution is increased to 7.8%, which checks the amounts found in the previous experiments. If the Nacconol is reduced by half, 5.7% of the dye remains unadsorbed. Whereas, if the detergent is held at 8% owf and the dyestuff is doubled, the unadsorbed dye is increased to 18.7% of the total.

These results show, as before, that one sulfonate tends to hold the other in solution. Doubling the amount of dyestuff increased the residual amount in solution, but still a major part of the additional dyestuff is adsorbed. In the case of Nacconol, doubling the amount of Nacconol from 4 to 8% only increased the unadsorbed Nacconol from 1.9 to 3.2%. Whereas, doubling the amount of dyestuff increased it from 3.2 to 5.4%.

CONCLUSIONS

In the case of wool, which has a high affinity for both Nacconol NR and dyestuff, both of which are sulfonates, there is almost complete adsorption. The major part of either sulfonate is adsorbed very quickly.

With a simple dyestuff, such as Wool Orange A Conc, the addition of Nacconol NR tends to increase the amount of dyestuff remaining in solution. Where insufficient dye to maintain equilibrium is in solution, the strong Nacconol solution can withdraw dyestuff already fixed to the wool fiber.

While it is not possible, from these preliminary data, to draw definitive conclusions, there are indications that equilibrium is established in the dyeing process and that any effect of the detergent on the dyeing operation must be a result of this equilibrium condition.

ACKNOWLEDGEMENT

Acknowledgment is made to J E Walter for his part in carrying out the experimental work involved in this study.

REFERENCES

(1) Am Dyestuff Reptr 51, 139 (1952).
(2) J Soc Chem Ind 67, 45 (1948).

DISCUSSION

Question: How can Nacconol NR be removed from wool?

Answer: I do not know of any simple method as it is held quite tenaciously. Even repeated treatment in fresh boiling water does not remove it all. It is much more easily removed from cotton, but even there it is difficult to get the last traces out. It is even difficult to remove Nacconol completely from an inorganic product like cement. The adsorption on wool is less at pH values above 6.5 than below, that is, adsorption increases with increase in acidity. Conversely, desorption is easier in alkaline solution, but even in an alkaline solution there is still considerable adsorption. Nacconol NR is best removed from wool by successive extraction with solvents other than water.

Q: Do you care to comment on why Nacconol theoretically reduces the adsorption of acid dye on wool?

A: From what I have read I would say that wool has more preference for linkage with certain molecules and configurations than with others. It is interesting, however, that quite an appreciable amount of either acid dye or Nacconol NR alone can be taken up by wool before adsorption tapers off appreciably. Adsorption does drop off percentagewise as the concentration of either of these sulfonates increases.

Q: Is there any bonding between Nacconol and acid dye, and, if so, would the formation of a larger molecule from this bonding cause less adsorption?

A: It is a fact that not so much goes on when both are present as when either is present separately at the same concentration. However, I would not expect the two to be bonded together. I want to add that adsorbed Nacconol NR increases the resistance of wool to moth attack.

REPORTS FROM THE LOCAL SECTIONS

Hudson-Mohawk

THE April 9th meeting of the Hudson-Mohawk Section was held in the cafeteria of the Rensselaer plant of the General Aniline Works, Rensselaer, N Y, with Councilor Albert E Herrmann, Jr acting as toastmaster.

Guided tours through the dyestuff manufacturing facilities and laboratories of the plant were held for members and guests during the afternoon and evening after a welcome from Chandler White, vice president and general manager. Mr White outlined the progress and production items of the plant from its conception to date.

At the business meeting, which was conducted by Chairman Irwin J Smith, Henry Herrmann, AATCC past president, spoke on the Association's growth by sections and discussed the role of the local section in the overall picture. Mr Herrmann was followed by J Robert Bonnar, AATCC president, who stressed the importance of the local sections to industry and the Association as a whole. He also discussed the textile situation in respect to the overall economy of the country.

Harold Simon, plant chemist, General Aniline Works, gave a demonstration of chemical "magic" utilizing dyestuffs and chemicals as the theme of his show.

The meeting attracted 75 members.

Mid-West

THE Spring meeting of the Mid-West Section was held at the Netherland Plaza Hotel, Cincinnati, O, on April 10, 1954.

Approximately 80 members and guests attended the afternoon session, at which Henry Millson, Dyestuff Department, American Cyanamid Co, spoke on the "Effect of Sequestering Agents on Cotton and Wool Dyes."

Chairman Stott named the following committee to work out the details of the Section-sponsored scholarships for textile students: Elliott Morrill, *chairman,* Joseph H Jones, Samuel Klein, Arthur T Brainerd, and Arthur I Hultberg.

87 members and guests attended the evening session, at which Jean Kern, National Aniline Division, Allied Chemical & Dye Corp, spoke on "Dyeability of Modern Synthetics."

NOTICE TO SECRETARIES AND PUBLICITY CHAIRMEN OF LOCAL SECTIONS

Papers presented before local sections should be sent to Dr Carl Z Draves, Editor of the *Proceedings,* 30 Lahey Street, New Hyde Park, New York. Authors should provide two copies for this purpose.

Reports of local section meetings should be sent to the American Dyestuff Reporter with copies going to Dr H C Chapin, National Secretary.

Dates of meetings and advance notices of meetings should be sent to the American Dyestuff Reporter with copies also going to Dr Chapin. For publication in any particular issue, information should be in the office of the Reporter 17 days before the issuance date.

LTI-NNE Meeting Attracts 162

ONE hundred and sixty-two members and guests were treated to a diversified program on April 9th as the Lowell Technological Institute Student Chapter once again played host to the Northern New England Section at Lowell, Mass. Nancy J Geary, vice chairman of the LTI Student Chapter, served as Program Chairman.

During the afternoon, students conducted various groups to the following demonstrations throughout the Institute:

The Electron Microscope: Its Use and Operation———Leo Barish

The G E Recording Spectrophotometer: Analysis of Color Difference due to Fading —Nassos Anninos

The Spectrograph: Textile Analysis—David Kwok

The Instron: Load-Elongation and Stress-Strain Analysis—Thomas Garvey

Paper Making and Converting

Leather Finishing

Following dinner in the Institute cafeteria, the meeting adjourned to the Eames Hall Lounge, where NNE Section Chairman Ernest R Kaswell, Fabric Research Laboratories, introduced LTI president Martin J Lydon. Upon the completion of President Lydon's welcoming remarks, the following papers were presented by members of the Student Chapter:

"Acetate Dyeing: Interfacial Film Phenomena"—Edwin C Sherburne, BS, LTI

"Friction and Lubrication of Nylon Parachute Materials"—Harry J Demas, BS, LTI

"Wool Dyeing: Effect of Dye and Acid Valence"—Joseph B Levy, BSc, Tech Manchester Univ

A discussion period followed each paper.

As has been the custom over the past several years, the Northern New England Section holds one meeting a year in conjunction with the LTI Chapter. The Student Chapter in turn presents the entire program. The success of the annual affair appears evident in the constantly increasing attendance.

Officers of the LTI Student Chapter include Mr Levy, *chairman;* Miss Geary, *vice chairman;* David F Torchia, *treasurer;* Chester J Petkiewicz, *corresponding secretary; and* Tina Valentas, *recording secretary.*

Edwin C Sherburne, speaker

Joseph B Levy, speaker, and Nancy J Geary, Program Chairman

(Photos by Peter C Canovai)

The nontechnical phase

Harry J Demas, speaker, and Miss Geary

Prof John H Skinkle, director of the LTI Research foundation (left) and Ernest R Kaswell, chairman of the Northern New England Section

L to r: Ernest P James, Laurence F McMahon, Charles E Sheehan, James W Sweeny, Vincent J McKone

Meeting of the Pacific Southwest Section — March 26, 1954

(See page P282 — April 26th issue)

(Photos by A H Roberts, Jacques Wolf & Co)

Top Row

Left: J Delabarre, Sandoz; H W Ellworth and G Harte, West Coast Carpet Dyers

Center: C H Lindsey, UCLA, featured speaker; S Springer, Sidney Springer Co, PSW chairman

Right: G M Moisson, California Hand Prints; W B Campbell, Pacific Textile Processing; L Szabo, California Hand Prints

2nd Row

Left: R A Fliegel, National Dyeing and Finishing Corp; T B Smock, General Dyestuff; S Dadone, Los Angeles Piece Dye Works

Center: Henry E Salomon and W F Wigglesworth, United Piece Dye Works

Right: W A Ingham, National Aniline; P F Noonan, National Dyeing and Finishing; L F Olsen, Ciba

3rd Row

Left: R G Butler, Dyecraft Corp; M Kramer, Hollywood Hand Prints; C P McCann, Pacific Textile Processing

Center: R Mishell, Dyemasters Inc

Right: F Thatcher and R D Andersen, Modern Dyers; F L Wilhelm, American Aniline; M Behrendt, Catalina Knit Mills, Inc

4th Row

Left: C F Donyes, Hess Goldsmith; A Smedicor, UCSB

Center: W H O'Briant, National Dyeing & Finishing Corp; S A Tucker, UCLA

Right: E Meshke, UCSB; W Jones, U S Testing Co; E Peterson, UCLA

"The group of fifteen editors responsible for this monograph consists of a well-balanced cross-section of American industry concerned with the production, marketing and application of vat dyes. The AATCC is to be congratulated on the production of a comprehensive survey of American vat dyeing and printing practice which is the major theme of this application . . . the book will be useful as a work of reference at this side of the Atlantic and as a working manual for the American colorists for whom it was designed. . . . If a clear account of American practice is required . . . the enquirer *must* have access to this volume" —*JOURNAL OF THE TEXTILE INSTITUTE* (England).

"THE APPLICATION OF VAT DYES"

AATCC Monograph No. 2

Price $5 per copy, postpaid, to members; to nonmembers it is $6 per copy. Send your check or money order to Dr H C Chapin, P O Box 28, Lowell, Mass.

"This book . . . is abreast of the latest technical developments and research. Its value is increased because of the lack of books in this field today . . . we can readily recommend this book to all technical and practical men" —*MELLIAND TEXTILBERICHTE* (Germany).

"This monograph contains the work of many mill-experienced authors, plus good, sound chemical and application principles developed in the laboratories and mills enjoying AATCC membership. . . . This book puts between two covers much information that a dyer is constantly searching for. It is a good investment for any laboratory, dyehouse, or printshop" —*TEXTILE WORLD*.

". . . this monograph should be in the hands of every user of vat dyestuffs, every student and every teacher. The book is well indexed and includes valuable lists of equivalent trade names. It will certainly take its place as a standard book of reference" —*JOURNAL OF THE SOCIETY OF DYERS AND COLOURISTS* (England).

AN EVALUATION OF A TENSIONING DEVICE FOR USE WITH THE TABER ABRASER

ELIZABETH FLOWERS THOMAS and GEORGE SIMS WHAM, JR

College of Household Arts and Sciences, Texas State College for Women

This is the eighth in a series of reports on methodology studies related to the testing of textile fabrics for abrasion resistance, conducted under the sponsorship of the American Viscose Corporation. This report is based on a study conducted at the Texas State College for Women.

INTRODUCTION

AMONG several suggestions proposed by Zook *(1,2,3,4,5)* for standardizing the method of making tests for abrasion resistance of textile fabrics was the use of a platform tensioning device, which would place a constant tension on the textile specimen while it was being mounted preparatory to a test. Zook *(6)* designed this simple tensioning device while she was a research worker at the Ellen H Richards Institute, School of Chemistry and Physics, The Pennsylvania State University. This investigator found that nonstandard methods of applying tension to textile test swatches while they are being mounted constitutes a source of error in making tests with a Taber abraser.

In summarizing the report on this constant-tension-mounting equipment, Zook states: "This new tensioning device is designed to insure the application of uniform tension to a textile fabric specimen while mounting it preparatory to an abrasion determination using a Taber abraser. Preliminary results indicate that some of the variation in abrasion tests may be eliminated by the use of such a device."

The purpose of the study covered by this report was to continue the previous work, and to evaluate statistically the aforementioned constant-tension-mounting device when used by 10 operators with 10 different test fabrics each. A detailed description of the constant tensioning mounting device, with photographs, has been given previously by Zook *(6)*; diagrammatic illustrations are shown in Figures 1 and 2 of this report. The constant-tension-mounting apparatus, in brief, consists of a platform designed to accommodate the turntable of the abraser and four large movable clamps, each of which holds one side of the square sample, and on which equal tension can be placed by using suspended weights.

When the specimens are to be mounted, the turntable is placed on the platform and the specimen to be tested is placed

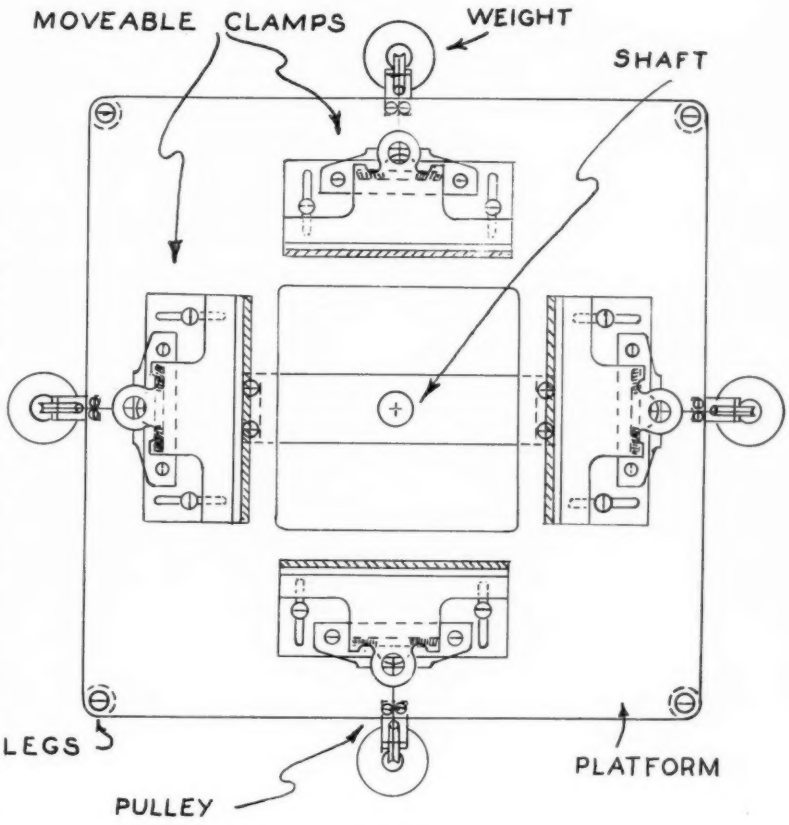


Figure 1
Constant-tension-mounting device for Taber abraser, top view.

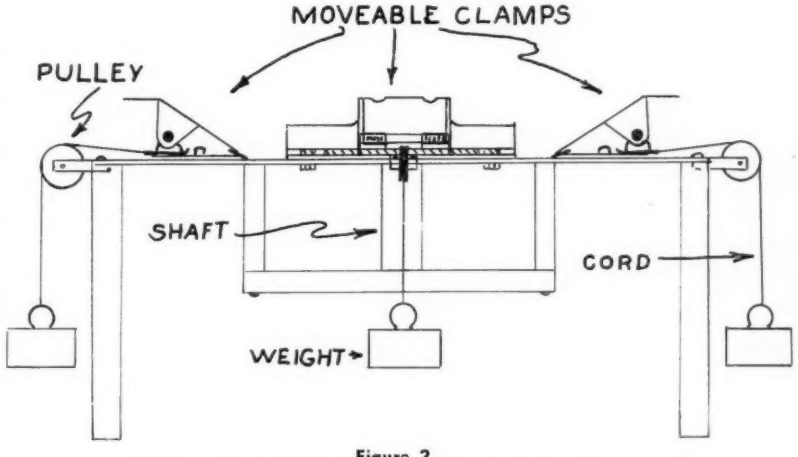


Figure 2
Constant-tension-mounting device for Taber abraser, side view.

TABLE I

EXPERIMENTAL FABRICS USED IN EVALUATING MOUNTING TECHNIQUES

Fabric	Fiber Content		Weight (oz per sq yd)	Yarn Type		Thread Count		Weave
	Warp	Filling		Warp	Filling	Warp	Filling	
Salyna Fabric 1	cotton and viscose	viscose and cotton	5.6	spun	spun	48	40	plain
Gabardine Fabric 2	viscose	viscose	4.9	spun	spun	134	65	2-2 twill
Gabardine Fabric 3	viscose	viscose	4.6	spun	spun	132	64	2-2 twill
Gabardine Fabric 4	viscose	viscose	4.3	spun	spun	136	66	2-2 twill
Dull luster taffeta Fabric 5	viscose	viscose	2.8	filament	filament	136	76	plain
Dull luster taffeta Fabric 6	viscose	viscose	2.7	filament	filament	96	71	plain
Dull luster taffeta Fabric 7	viscose	viscose	2.6	filament	filament	95	71	plain
Dull luster taffeta Fabric 8	viscose	viscose	2.5	filament	filament	136	72	plain
Bright taffeta Fabric 9	acetate	acetate	2.5	filament	filament	180	62	plain
Satin Fabric 10	acetate	acetate	2.5	filament	filament	197	70	5-shaft satin

directly upon it. Each edge of the specimen is inserted into one of the four wide, movable clamps, and equal tension is applied on the opposite sides of the fabric simultaneously. While the fabric is held under tension, the ring clamp is pushed down over the sample and the edges of the turntable, and the ring clamp screws are tightened. The edges of the mounted sample are released from the clamps and the specimen is removed from the mounting platform by lifting the turntable from the center shaft.

Table I summarizes the fabric type, fiber content, weight, yarn type, thread count, and weave of the 10 representative dress fabrics used in the study.

PLAN OF PROCEDURE

All of the samples taken from the experimental fabrics were abraded, using the standard research model E-4010 Taber abraser and standard accessories, including a power-stat regulator and a vacuum pick-up attachment for removing the detritus from the abraded sample. The abrasion wheels used throughout the study were of the CS-10 type. The wheels were refaced with the standard refacing stone ST-11 before each test.

Two methods of mounting the samples on the turntable of the tester were employed for the purpose of determining which would give the more uniform results. The first was the method customarily used, i e, the hand method, which provides no means of insuring that the tension on the test specimen is standard as it is mounted. The second involved the use of the controlled-tension mounting platform under investigation.

In order to determine the relative value of the two mounting techniques when used under ordinary laboratory conditions by persons of varying technical skills, 10 operators mounted samples from each of the experimental fabrics, using both the hand and the contsant-tension-platform methods. From each of the 10 fabrics, two sets consisting of four samples each were prepared by the individual operators. One set of the samples was mounted using the platform device. Two of the samples in each set were abraded with CS-10 wheels, which varied slightly toward coarseness, whereas the remaining two were abraded with wheels which ran slightly on the fine side with respect to the abrasion effects. The heavier fabrics were abraded 200 cycles under a load of 250 grams, while the lighter fabrics were subjected to 200 cycles using an abrasion load of 125 grams. All of the samples were abraded under standard conditions of 70° F and 65% relative humidity.

The results were ascertained in terms of the strength of the test fabrics after abrasion. The strips used in measuring breaking strength values of the textiles following abrasion were taken from the abraded specimens according to the method of Zook *(1)*, and were ravelled to exactly one-half inch in width. A pendulum-type Scott tester was used, and the strength tests were made under the same conditions of temperature and humidity as employed in conducting the abrasion tests.

The relative merits of the two methods of mounting the samples preparatory to abrasion, in terms of the reproducibility of the final breaking strength results, were obtained by statistical analyses, which would indicate the degree of dispersion of the results.

DISCUSSION OF FINDINGS

Table II gives the standard deviation calculated for the breaking-strength values obtained from the abraded samples of the 10 operators who made the 80 abrasion tests each, four on each of 10 different textile fabrics, by each of the two methods.

The variance of the results also was tested by obtaining the coefficient of variation recommended by the American Society for Testing Materials *(8)*. The results of these calculations are summarized in Table III.

The results as given in Tables II and III show a smaller dispersion of values for the breaking strengths of test strips from the abraded specimens mounted by means of the constant-tensioning device than by means of the hand method, with the results of all 10 operators grouped.

On the basis of individual fabrics, those of firmer weaves showed less variance than those of less stable construction, regardless of which of the two mounting techniques was used. Even in these cases, however, the dispersion was less when the constant-tension-mounting de-

TABLE II

AVERAGE STANDARD DEVIATION OF THE BREAKING STRENGTH VALUES OBTAINED BY TEN OPERATORS ON THE RESPECTIVE FABRIC GROUPS

Fabrics	SD of Filling		SD of Warp	
	Hand-Mounting method	Constant-tension-mounting method	Hand-mounting-method	Constant-tension-mounting-method
Fabric 1 Salyna	1.71	1.52	1.32	1.18
Fabrics 2,3,4 Gabardines	3.14	2.86	1.74	1.67
Fabrics 5,6,7,8 Dull Luster Taffeta	1.33	1.08	1.33	1.07
Fabric 9 Bright Taffeta	0.77	0.52	0.67	0.41
Fabric 10 Satin	1.21	1.01	1.15	0.89
Average standard deviation for the operators based on the individual fabrics	1.84	1.59	1.37	1.19

TABLE III

AVERAGE COEFFICIENT OF VARIATION FOR TEN OPERATORS IN THE STRENGTH OF THE ABRADED FABRICS WHEN MOUNTED BY THE HAND METHOD AND BY THE CONSTANT TENSION METHOD

Fabrics	Warp		Filling	
	Hand-mounting method	Constant-tension method	Hand-mounting method	Constant-tension method
Fabric 1 Salyna	10.8	9.2	28.8	23.2
Average of Fabrics 2,3,4 Gabardines	14.0	11.2	11.2	9.3
Average of Fabrics 5,6,7,8 Dull Luster Taffetas	27.6	19.6	17.4	13.7
Fabric 9 Bright Taffeta	13.7	9.1	9.3	8.5
Fabric 10 Satin	24.1	18.1	8.8	7.3
Average coefficient of variation for the operators for the average of the 10 representative dress fabrics	20.1	14.9	14.9	10.0

vice was employed. In the case of the gabardines the dispersion of results in the filling was much less than in the warp direction, undoubtedly because the filling yarns, protected by the warp, showed little abrasion at the end of the test in many cases.

The presence or absence of a stabilizing finish made a great difference in results with fabrics of comparable weave design. Thus, one dull-luster rayon taffeta with no stabilizing finish gave coefficients of dispersion in the warp of 40.6 and 18.7, respectively, for the hand and tensioning-device methods, and 30.4 as opposed to 15.9 in the filling direction. Contrasted with this, another dull-luster rayon taffeta of almost identical construction, but with a stabilizing finish, showed coefficient of variation values for the 10 operators little different for the two mounting methods.

The data presented in Tables II and III do not differentiate between the variance resulting from the operators and that for which the fabrics are responsible. Where a variance component estimation was made between the operators, using the method of the analysis of variance, the variation in performance between the 10 operators on a per fabric basis proved to be greater for the hand method of mounting the samples in all cases except for the filling direction of one gabardine fabric and for a dull luster taffeta fabric with a stabilizing finish.

When a coefficient of variation was obtained for within-operator variance as to the variation in the breaking strengths of the abraded fabrics, using an analysis of variance technique, the overall coefficients were the following:

Warp Direction of Fabrics

Hand Method of Mounting . . . 15.4
Tensioning-Device Method . . . 12.7

Filling Direction of Fabrics

Hand Method of Mounting . . . 11.7
Tensioning-Device Method . . . 10.3

SUMMARY

The evidence derived from statistical analysis of the data, obtained by calculating both standard deviations and coefficients of variability of breaking-strength strips taken from abraded textile specimens showed that there was less dispersion of the values obtained by 10 operators working with 10 fabrics when the specimens were mounted in the abraser by means of a tensioning platform than when mounted by hand.

The difference in variance between the abrasion results obtained with the constant-tension-mounting platform and the hand-mounting method was wider with fabrics of poor dimensional stability than with those of firm weave, although the dispersion of values was less for the former mounting technique, even with fabrics of good dimensional stability.

The variance in results tended to be narrowed to a greater extent for the fabrics with less dimensional stability.

When a coefficient of variability was applied on an analysis of variance for between-operator performance, the dispersion of results varied for the different operators; but the over-all variation was reduced by the employment of the tensioning platform for mounting the abrasion specimens in comparison with the hand-mounting method.

The statistical analysis of variability of within-operator performance showed that, given one operator or one set of operators, the variability of breaking-strength results for a wide variety of fabrics is markedly reduced when the constant tensioning device is used in mounting abrasion specimens in the Taber abraser.

ACKNOWLEDGMENTS

The authors are indebted to the American Viscose Corporation under whose sponsorship this study was conducted. They also wish to express appreciation to Pauline Beery Mack for advice and assistance during the conduct of this investigation, and to the 10 co-operators who mounted the test specimens and conducted the tests.

BIBLIOGRAPHY

(1) Zook, M H, *Am Dyestuff Reptr* 39, 625 (1950).
(2) Zook, M H, ibid 39, 679 (1950).
(3) Zook, M H, ibid 39, 795 (1950).
(4) Zook, M H, ibid 39, 895 (1950).
(5) Zook, M H, ibid 40, 661 (1951).
(6) Zook, M H, ibid 40, 745 (1951).
(7) Committee E-1, American Society for Testing Materials, *ASTM Manual on Presentation of Data*, p 14.

GENERAL CALENDAR

AMERICAN CHEMICAL SOCIETY
National Chemical Exposition—Oct 12-15, Chicago, Ill.

AMERICAN LEATHER CHEMISTS' ASSOCIATION
1954 Convention—June 6, Bedford Spring Hotel, Bedford, Pa.

AMERICAN SOCIETY FOR QUALITY CONTROL
Annual meeting, Textile Div—Jan 27-29, Clemson College School of Textiles.

AMERICAN SOCIETY FOR TESTING MATERIALS
Annual Meeting—June 13-18, Sherman and Morrison Hotels, Chicago, Ill.

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS
Quebec Section—June 19 (Annual Golf Tournament).

CHAMBRE SYNDICALE TRAMAGRAS
International Detergent Congress—Aug 30-Sept 5, The Sorbonne, Paris, France.

DEUTSCHE GESELLSCHAFT FUR CHEMISCHES APPARATEWESEN
Achema XI—May 14-22, 1955, Frankfurt am Main, Germany.

DRYSALTERS CLUB OF NEW ENGLAND
June 25 (Annual Outing, Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY
Fall Meeting—Sept 13-14, McGill University, Montreal, Canada.

GORDAN RESEARCH CONFERENCES, AAAS
July 12-16, Colby Jr College, New London, N H.

INTERNATIONAL CONGRESS OF MAN-MADE FIBERS
May 31-June 3, Paris, France

PHILADELPHIA TEXTILE INSTITUTE ALUMNI ASSOCIATION
53rd Annual Reunion, June 11, Manufacturers Golf & Country Club, Oreland, Pa.

SOUTHERN TEXTILE EXPOSITION
October 4-9 (Textile Hall, Greenville, S C).

• PATENT DIGEST •

PAUL WENGRAF

FLAMEPROOFING WITH NITROGEN-PHOSPHORUS-CONTAINING COMPOUNDS G, 2, 03

U S Pat 2,648,597
(Monsanto Chem Co——Nielsen——Aug 11, 1953)

The inventor has stated in a previous patent application (Ser 169,513 ex June 21, 1950) that water-soluble products useful for flameproofing result from the reaction of phosphorous oxychloride and ammonia at temperatures below 100°C followed by a heat aftertreatment (100-150°C); after the ammonium chloride is removed, a neutral or slightly alkaline compound is obtained that does not attack the impregnated textiles. According to the current patent the flameproofing effect of these products may be further improved by reacting the condensates with a lower organic acid, preferably acetic acid.

Example: The aforementioned condensate is mixed with glacial acetic acid and then allowed to stand for several hours. (It will be found that only a portion is soluble in acid). The acid is then diluted and used for impregnation, rendering the treated material flame-and wash resistant even after repeated washing cycles.

References cited by the Patent Office:

U S Pat 2,544,706 (Monsanto/1951): preparing the insoluble complex produced by heating melamine with phosphorous pentoxide to temperatures between 300-500° C.

U S Pats 2,415,112-3 (Celanese/1947): flameproofing cellulose acetate by applying ammonium bromide plus urea or diammonium alkyl phosphate plus an ammonium salt respectively.

U S Pat 2,305,035 (Sylvania Ind Corp/-1942) and U S Pat 2,286,308: using alkylolamine—or alkyl guanidine phosphates as flameproofing agents.

U S Pat 2,262,634 (Monsanto/1941): flameproofing with ammonium salts of low alkyl phosphoric acid esters.

U S Pat 2,071,353 (Sylvania Ind Corp/-1937) describes a flameproofing agent consisting of a phosphoric acid salt of an aliphatic nitrogenous base, such as ethanolamine.

DURABLE FINISH——— Starch, Methylolurea, Thermoplastic Polymers G, 2, 01

U S Pat 2,653,140
(Canadian Ind Ltd——Wentworth, MacKenzie ——Sept 22, 1953)

Although several combinations of starch and thermosetting resins are known, most of them disadvantageously retain chlorine when treated with chlorine-containing bleaching agents. This results in a yellowing of the starch and the development of free hydrochloric acid, thereby imparing the fiber strength. Moreover, fabric hand becomes unduly harsh.

An essential improvement is said to be attained by adding to the aforementioned components (starch and dimethylolurea) a water-soluble copolymer of an unsaturated acid, such as acrylic or crotonic, an amide of one of these acids, such as acrylamide, and at least one unsaturated polymerizable compound having the ethylenic group as the sole unsaturated group, e g, vinyl acetate. A preferred composition comprises 12.7 parts starch, 2.3 parts vinyl acetate — crotonic acid — crotonamide copolymer, and 1.0 part dimethylolurea. These copolymers are water insoluble and must be solublized with ammonia. After impregnating, air drying and heating to 150° C or more by ironing, one may obtain a durable finish showing no discoloration or reduction in tensile strength. The resultant hand is said to be "lofty and full."

Reference cited by the Patent Office:

U S Pat 2,378,169 (Du Pont/1945) describes several resin compositions which may be used as textile impregnating agents. They contain interpolymers of esters of unsaturated acids, e g, nitro methyl propyl methacrylate, and an organic compound that is polymerizable with this ester.

THE following German patents relative to the wet-processing and allied fields of the textile industry have been published in the *Deutsches Patentblatt*. For further information, write to Dept W, *American Dyestuff Reporter*.

Patent No.	*Date*	*Assignee and Title*
901,408	11/26/53	Farbwerke Casella, "Shrinkproofing Wool-Containing Material"
902,367	12/3/53	Dynamit Akt Ges (formerly Alfred Nobel & Cie, "Process for Improving Properties of Textiles"
902,126	12/3/53	Farbwerke Hoechst AG, "Process for Dyeing and Finishing Textile Material"
902,485	12/10/53	Farbenfabr Bayer-Doser, "Hydrophobing Agent"
902,611	12/10/53	Bachmann Uxbridge Worsted Corp-Walter, "Wool Dyeing Process"
902,722	12/10/53	Farbenfabr Bayer-Rabe, "Dyeing Copperable Direct Dyes in Iron Apparatuses"
902,723	12/10/53	Farbwerke Hoechst-Huss, "Dyeing Mixed Fabrics Containing Animal Fibers and Cellulose"
903,207	12/17/53	Farbenfabr Bayer, "Creaseproofing Cellulosic Fiber Material"
903,326	12/17/53	Farbwerke Hoechst-Fuchs, "Process for Dyeing with Acid Dyes and Composition Therefrom"
903,812	12/24/53	Deutsche Gold & Silber Sch Anst-Hundt, "Bleaching Artificial Textile Fibers"
903,926	12/31/53	Deutsche Gold & Silber Sch Anst-Bayer, "Process of Treating Laundry with Chlorite"
903,927	12/31/53	Gerstner, "Substitute for Glycerine in Finishing Textiles"
903,928	12/31/53	Bad Aniline & Soda Fabr-Muehlbauer, "Vat Dyeing Process with Metaliferous Phthalocyanines or Porphines"
904,524	1/7/54	Hoechst, "Flameproofing Textiles"
905,011	1/14/54	Hoermann, "Increasing the Bleaching Effect of Oxygen-Containing Bleaching Agents"
905,846	1/21/54	Farbenfabr Bayer, "Hydrophobing Process"
906,213	1/28/54	Farbenfabr Bayer, "Producing Ice Colors in Printing Process"
906,214	1/28/54	Farbwerke Hoechst, "Printing Polyamide Fiber Fabrics"
906,326	1/28/54	Chem Fabr Theod Rotta, "Increasing Washfastness of Creaseproofed Textiles"
906,805	2/4/54	Lohmann GMBH, "Dyeing Thermoplastic Fibers and Fabrics Made Thereof"
906,806	2/4/54	Nestelberger, "Preparing Stable Leucovats"
907,044	2/11/54	Ver Jutespinnereien AG, "Removing the Fishy Odor from Aminoresin-Prepared Fabrics"
907,163	2/11/54	Farbwerke Hoechst, "Hydrophobing Natural Animal or Vegetable or Synthetic Fibers"

ANIMALIZED CELLULOSE ———Cationic Aminotriazine-Formaldhyde Solutions C, 4, 06

U S Pat 2,654,715
(Am Cyanamid Co——Dixon, Woodberry——Oct 6, 1953)

In U S Pat 2,332,047 (Rohm & Haas—see reference below) it is suggested that the affinity of viscose to acid dyes might be increased, i e, "animalized," by treating with certain amino-triazine resins.

The incorporation of water-soluble melamine resins with a viscose spinning mass has been attempted in order to obtain regenerated, animalized cellulosic fibers of good water resistance. The results were found to be unsatisfactory, however, because 60-80% of the resin was lost in the regenerating process, and also some in the subsequent dyeing procedure.

The object of the present invention was to produce viscose in which an aminotriazine is durably incorporated, thereby giving it increased affinity for acid wool dyes. This reportedly is accomplished by adding to the viscose spinning dope an amino triazine resin acid colloid, known as Resin Colloid A. The preparation of such colloids is protected by U S Pats 2,345,543 and 2,417,014 (see references below). 100 parts of a methylated trimethylolmelamine are dissolved in 831 parts of water at approximately 22° C and 72.2 parts of glacial acetic acid are added. After standing for about 24 hours, an acid colloid, containing 3 mols acetic acid for each mol of methylated trimethylolmelamine, is formed. Other acids, such as lactic, formic or hydrochloric, or other substituted melamine or guanamine derivatives may be substituted for the aforementioned components.

Resin Colloid A is diluted and added to a xanthate solution before spinning. The resin colloid is immediately precipitated upon mixing with the viscose dope. After regeneration the material has to be dried and cured at 110° C. The resin is fixed within the fibers that have strong affinity for acid dyes, such as Calcocid Alizarine Blue SAPG.

Although the examples refer to the preparation of films, filaments are produced in an analogous way. *Direct treatment of regenerated fibers* with the resin colloid———instead of adding it to the spinning mass———results in unsatisfactory color retention and a stiff hand.

References cited by the Patent Office:

U S Pat 2,417,014 (Am Cyanamid/1947): preparing an acidic (pH 4-6.8) solution of a partially polymerized melamine-formaldehyde condensate in an aqueous polyhydric alcohol solvent.

U S Pat 2,370,517 (Dow Chemical/-1945): rendering cellulose ether finishes insoluble by adding an alcohol-modified melamine-aldehyde resin, coating with this solution, drying and curing.

U S Pat 2,345,543 (Am Cyanamid/1944): aminotriazine resins, prepared in the presence of free acids or subsequently treated with acids, can be converted under appropriate conditions into colloidal dispersions of cation-active character, undergoing progressive polymerization.

U S Pat 2,332,047 (Rohm & Haas/1943): animalizing cellulose by reacting with aminomethylene triazine, obtained for example from melamine, formaldehyde and dimethylamine, and curing the resin after drying at 90-140° C.

FLAMEPROOFING——— Titanium Chloride Acylate G, 2, 03

U S Pat 2,658,800
(National Lead Co——Sullivan, Panik——Nov 3, 1953)

The preamble to this specification states that titanium compounds have been used in various fire-resistant processes, but mostly the metal has been used in the form of the dioxide for obtaining pigment effects. The present invention seeks to develop a fire-resistant agent that will not alter the physical properties of the fibers while imparting durable glow- and flame-resistance on the basis of titanium compounds.

It has been found that a specific form of titanium salt, i e, acylated titanium chloride, produces the effect desired. Examples of the acylate include acetate, formate or propionate. An aqueous solution of titanium chloride acetate is prepared by dissolving lead acetate 2:1 in water and adding the concentrated solution to an 18% titanium tetrachloride solution, maintaining the temperature below 25° C. Lead chloride that had been precipitated is removed, and the titanium chloride acetate solution is subsequently adjusted to a concentration of 6% titanium per liter and used for impregnating cloth. The impregnating agent gelatinizes upon air drying. Thereafter the cloth is treated for 5 minutes in soda lye, squeezed and rinsed well until the washing liquid has a pH of only 8. According to a table, the "45° Microburner Test" (cf "Flameproofing Textile Fabrics" by R W Little, p 117) is very satisfactory; the effect can be improved further by adding antimony trichloride (1.9-5.75 p for each p of titanium) to this preparation.

Among the references cited by the Patent Office:

U S Pat 2,570,566 (Du Pont/1951) describes a flameproofing solution of titanium- and antimony salts in an inorganic monobasic acid, e g, hydrochloric; the weight of titanium tetrachloride exceeds that of antimony trichloride [cf *Am Dyestuff Reptr 41*, 87 (1952)].

U S Pat 2,547,671 (Philadelphia Text Fin/1952): obtaining a flame-resistant composition by refluxing antimony trioxide with acetic anhydride, optionally combined with chlorinated paraffin.

Brit P 578,888 (Standard Oil Devel/1946) describes the use of double salts of halo-organic acids, such as chloroformates or chloropropionates of Al, Ti, Zr and the like, as Friedel Craft catalysts.

DURABLE FINISHES——— Carboxymethylcellulose Reacted with Zirconium Salts G,2,01

U S Pat 2,650,887
(Hercules Powder Co——Elliott——Sept 1, 1953)

The preamble to this patent points out that solutions of the sodium salt of carboxymethylcellulose insolubilized by an aftertreatment with acids do not produce sufficiently durable effects as a textile size. Disadvantages include insufficient resistance to repeated launderings and the strong alkaline condition of the solutions applied, thereby precluding the treatment of alkali-sensitive fibers.

The present invention aims at obtaining a more durable finish on the base of carboxymethylcellulose that would be resistant not only to several laundering operations, but also to alkaline and acid treatments as well. It has been found that great improvements in this respect are effected by impregnating the cloth first in water-soluble carboxymethylcellulose and then treating with a water-soluble zirconium salt; after precipitation the remaining zirconium salt is removed by washing, preferably with dilute soda ash. When the latter treatment (soda ash) is combined with a water-soluble soap treatment, the zirconyl soaps thus formed produce a water-repellent effect in addition to the permanent finish.

Example: a cloth is padded in a 2% solution of the sodium salt of carboxymethylcellulose, squeezed to a pick-up of 100%, and then immediately placed in a boiling 10% solution of sodium zinconylsulfate for 15 minutes, after which it is further washed for 10 minutes in a dilute sodium-carbonate-soap-containing solution. The finish is reportedly resistant to strong aqueous acids and alkaline solutions and will withstand 12 washing cycles on the Launder-Ometer.

Among the references cited by the Patent Office:

U S Pat 2,426,300 (Edelstein/1947): applying alkaline solutions of cellulose in sodium zincate combined with wax as a waterproofing agent, then acidified for precipitation and optionally aftertreated with a metal salt, e g, aluminum (preferably), tin or zirconium [cf *Am Dyestuff Reptr 36*, 787 (1947)].

U S Pat 2,420,949 (Rohm & Haas/1947): producing fibers or films from carboxyalkylcellulose containing zirconium dioxide.

● ABSTRACTS ●

The Use of Sodium Chlorite for Linen Piece Bleaching

Anon, *Textile J Australia* 28, 828-30, September, 1953.

The main reasons for the favorable consideration of sodium chlorite, as a more rapid, safe and easily controlled bleach, as listed by the author, are:

1) Elimination of tendering and/or formation of oxycellulose due to over-bleaching, since its oxidation potentials even in the lower pH ranges (3 to 4) do not rise high enough to produce such injurious conditions.

2) Production of a more permanent white, with weight losses of not over 10 per cent on fully bleached cloths.

3) Sodium chlorite has a solubilizing effect on sizes, thereby rendering more absorbent cloth thus bleached, with obvious advantages in subsequent dyeing and finishing operations.

4) Antichloring and souring processes can be eliminated, and washing operations reduced to a minimum, retention of a small percentage of chlorite by the cloth having no real detrimental effects on subsequent treatments or storage.

5) The use of chlorite lends itself more easily to continuous processing (in the case of cotton) in either rope or open-width form, with attendant advantages in chemical, time, and labor saving, and in the subsequent production of uniform cloth.

6) If required, chlorite can be used successfully in the removal of "Tinopal" from goods so treated, even if these have not been bleached originally by chlorite.

7) Effluent problems (now of paramount importance to bleachers and dyers) are reduced.

Together with concentrations and temperatures, pH values have decided influence on the economic use and rate of bleaching action of chlorite; consequently this chemical cannot be used with complete safety in the existing plant to be found in the average bleachery.

The use of stoneware-lined tanks, vessels, or pots, together with similarly lined circulating pumps, pipes, and valves, provides one answer to this problem, as do certain stainless steels, which can be used, provided that a quantity of sodium nitrate is added to the bleaching solution, in order to minimize, if not entirely eliminate, the corrosive effect of the acidified chlorite liquor.

The expense of installing such special plant, together with modification of existing equipment, is compensated, however, according to the author, by reduction in labor and processing time, and by the production of superior cloth the wearing properties and appearance of which are enhanced, compared with cloth of similar quality bleached by orthodox methods.

The author submits details of the methods recommended for bleaching linen sheetings, damask, handkerchiefs, etc, with sodium chlorite.—WHC

THPC-Resin Flameproofing

W A Reeves, *Textile Bull* 79, 98-9, October, 1953.

It has been found that permanent flame resistance may be imparted to cotton fabrics by treating them with aqueous solutions containing tetrakis (hydroxymethyl) phosphonium chloride (THPC), methylolmelamine, and other substances, followed by drying and curing. THPC polymerizes with the methylolmelamine to form an insoluble resin inside the cotton fibers.

THPC is a crystalline compound that is soluble in water and in many organic solvents. It is made by reacting phosphine with aqueous hydrochloric acid and formaldehyde.

A typical resin-forming solution consists of 15.8 percent THPC, 9.5 percent trimethylolmelamine, 9.9 percent urea, and 3.0 percent triethanolamine. Essentially all of the trimethylolmelamine polymerizes with the THPC and becomes part of the flameproofing agent. During the polymerization, hydrochloric acid is split out of the THPC molecule. Urea is present in the formulation to tie up this free acid in order to protect the cotton from acid tendering.

The triethanolamine also plays an important role in the resin-forming solution. A water solution of THPC, trimethylolmelamine and urea, all in concentrations referred to above as a typical solution, will polymerize to a viscous liquid or even gel within a few hours at room temperature. The use of such a viscous solution tends to cause fabric stiffness. Less than 1 percent of triethanolamine retards this polymerization, and 4 percent will stabilize solutions for several hours.

If grey goods are processed, a wetting agent must be incorporated in the resin-forming solution in order to wet out the material. Triton X-100 is suggested.

The temperature of the cure is dependent on length of time cured. Eight-ounce twill is adequately cured in about 4½ minutes at 285° F.

Although the resin treatment does not lower the breaking strength, it generally reduces the tear strength of goods, but if a softener, like Triton X-100, is applied after the resin treatment, the tear strength is usually equal to that of the untreated fabric.

Only about 10 percent resin is required to flameproof 32-oz duck belting, whereas about 16 percent is required for 8-oz twill and about 32 percent for 2-oz marquisette.

A very important property of materials flameproofed with THPC resins is that the goods are also glowproof. An after-treatment with a mildew-proofing agent is not necessary for flameproofed goods because the resin itself protects the materials from microorganisms.—WHC

Some Experiments on the Overdyeing of Nylon

C D O'Briain and R H Peters, *J Soc Dyers Colourists* 69, 435-9, November, 1953.

Acid dyes have been employed to a considerable extent in the dyeing of nylon because of their good fastness properties. Unfortunately, when dyed in mixtures under normal conditions of acid concentration (e g, pH 3-4) they exhibit incompatibility to an extreme degree. For this reason, studies of the dyeing mechanism (by Vickerstaff, Peters, Elöd and Fröhlich, and others) are important, and have proved of value in overcoming practical dyeing difficulties. The present work was undertaken to throw further light on the subject.

The author describes experiments made on micro dull nylon yarn with three typical acid dyes in sulfuric acid baths. Rate-of-dyeing curves were measured for nylon dyed under very acid conditions (pH about 1.5). The curve falls into two parts; in the initial stages the uptake is rapid, and this is followed by a slow increase in dye concentration which does not reach a maximum even after 120 hours, indicating that new sites for adsorption of dye are being created as the dyeing proceeds.

By stripping the dye from the fiber (with ammonia) and redyeing under conditions of higher pH (5.0), the number of free amine ends was estimated. From the results it was shown that during the second part of the rate-of-dyeing curves hydrolysis occurs, giving an increased number of amine groups. The amount of dye taken up at the low pH values is, however, far in excess of that required to saturate the amine groups, and must be accounted for by "amide group" dyeing. Viscometric measurements were also used to confirm the hydrolysis.

The picture of the dyeing process at low pH is, therefore, initial adsorption of dye onto sites provided by the peptide

groups either as the free dye acid or by absorption of the hydrogen ions in the dyebath followed by the dye anion. Simultaneous with the absorption is a slow but definite hydrolysis of the nylon molecules with consequent degradation of the fiber.

Twelve references to the literature are cited.—WHC

Studies in the Fundamental Processes of Textile Printing. VI—— The Transfer of Disperse and Water-Soluble Dyes to Nylon During Steaming.

E H Daruwalla and H A Turner, *J Soc Dyers Colourists* 69, 440-8, November, 1953.

The nylon (superpolyamide) group of fiber substances are particularly interesting because, while they resemble the polyester fibers in possessing a high affinity for disperse dyes, they differ in behaving as characteristically basic fibers, and are thus able to fix soluble anionic dyes from neutral or acid baths.

Earlier experiments have already confirmed practical experience by showing that the transfer of water-soluble acid and acetate-rayon dyes to cellulose acetate during steaming is not very great in the absence of suitable fiber-swelling or dye-dispersing agents. With nylon, as might be expected, the uptake of dyes in these classes can be very large, and it can be controlled primarily by adjusting the concentrations of hydrogen and other readily diffusible ions in the thickener phase.

The work reported in Part V of this series* has been extended to include a study of the transfer to nylon of two disperse (insoluble acetate) dyes, two soluble acetate dyes, and three acid dyes (C I 176, 182, and 185).

The experimental technique used in these studies required that the fiber substance (nylon) should be in the form of a regular film. Starch films containing the various dyes, buffers, etc, were made and attached to the nylon film, which was then steamed for various periods of time. After steaming, the starch and nylon layers were separated, and the dye in each layer was estimated. Curves showing the rate of exhaustion during steaming time are shown.

The authors found that there is a close resemblance between the behavior of each of these three classes of dyes in dyeing and the transfer behavior during the steaming operation in printing. This was demonstrated by a comparison of the present experimental results with those that had been obtained in quantitative studies of nylon dyeing by other workers.

Among the results obtained, it was noted that an increase in the number of sulfonic acid groups in the dye caused a reduction in the rate of transfer from starch to nylon, and a decrease in the pH of the system caused an increase in the rate of exhaustion for all the acid dyes tested.

The mechanism of the dyeing of nylon with acid dyes and the arguments for and against the theory of solid solution of disperse dyes are discussed by the author.

Twenty-nine references to the literature are cited.—WHC

Dyeing Under "Static Pressure" System

B Steverlynck, *Canadian Textile J* 70, 54, 57-8, July 31, 1953.

The dyeing of textile materials is influenced by many factors, such as selection of the dye, the nature and composition of the fiber and its swelling properties, the liquor ratio of the dyebath, the presence of assistants, the pH of the bath, the temperature, the relative movement between liquor and material, and the dyeing time. One of the main difficulties facing the dyer is that of effecting complete uniformity in the shade of the dyed material.

The dyeing of loose material, yarns, and even most textile fabrics, although performed by the appropriate machinery, still requires, under present conditions, a minimum treatment of two hours or even more to satisfy the primary requirement of good level dyeing.

Yarns which used to be treated exclusively in skein form are now processed mainly in packages or on beams. The skeins, packages, or beams are put into special apparatus where, by means of a pump, the dye liquor is circulated through the material.

These enclosed machines with two-way circulation are often wrongly described as being of the "high-pressure" type. In fact, the only pressure in the apparatus is that produced by the pump. All these machines actually function at atmospheric pressure, and the highest temperature which they can attain is not above 212° F.

Present-day pressure dyeing machines are fitted with circulating pumps having a relatively large output and high pressure in order to maintain a certain circulation when the dyebath reaches 185-194° F. These high pressure pumps have a disadvantage, namely, that the material to be dyed tends to become highly compressed, so making the circulation of the liquor through the material more difficult. Also, dyeing with the use of high pressure pumps may damage or felt the more delicate fibers, such as rayon or wool, and it encourages the formation of channels in the material.

Research carried out in the dyehouse of Teinturerie de Groeninghe, of Courtrai, Belgium, with a view to reducing the time required for dyeing rayon cakes, resulted in a dyeing machine working under static pressure, with the circulating system completely cut off from the atmosphere. By heating the bath indirectly, the liquor expands and produces an elevated pressure in the system. To offset this expansion, which might damage the apparatus and cause accidents, and to obtain a static pressure related to the liquor temperature, the "Steverlynck static process" machine uses an expansion vessel connected to the suction side of the pump. The air in this vessel is compressed by the expansion of the dye liquor and exerts a static pressure on the circulating liquor. This static pressure will balance the increase of the steam pressure, prevent the liquor from boiling, and ensure, even at temperatures above 212° F, the maximum output of the pump according to the inventor.

The machine has been patented in various countries and is said to be operating successfully in Courtrai, dyeing rayon cakes, cotton beams, wool packages, etc, with a considerable saving in time and a maximum of levelness.

The author believes that the new process will revolutionize wool dyeing. Treatment at 221° F does not alter the physical or mechanical properties of the wool fiber, he says.

The new synthetic fibers, nylon, Acrilan, Orlon, etc, can now be dyed in a much shorter time by the new method.—WHC

Stripping of Dyed Textiles

R S Prayag, *Indian Textile J* 63, 644-9, July, 1953.

Stripping has been defined as the process or processes by which a part or most of the color is removed from a dyed textile material.

The necessity for stripping may be due to any of the following reasons:

(i) When goods have been inadvertently dyed off-shade or too dark.

(ii) When goods have to be corrected for faulty dyeing.

(iii) When owing to changed conditions the material is not saleable or usable in its existing shade owing to changes in fashion.

(iv) When in the shoddy and rag trade the original color has to be removed to a greater or lesser extent in order to obtain the desired shade.

(v) When in garment dyeing the customer's requirements necessitate the removal of the original color.

The stripping agents, in general, include acids, alkalis, and salts; titanous chloride and sulfate, dichromate and sulfuric acid; dilute solutions of bleaching powder; sodium hydrosulfite, and sodium and zinc sulfoxylate formaldehyde. Substances used to accelerate the

* For abstract of Part V, see *Am Dyestuff Reptr* 42, 782 (1953).

stripping action include Dispersol VL, Albatex PO, and Lissolamines A and V.

Most direct dyes can be stripped from cotton goods in a hot bath of hydrosulfite and caustic soda. Basic dyes are usually removed by alkaline hydrosulfite or by titanous chloride in presence of oxalic acid.

Uneven sulfur dyeings are usually corrected by treatment with hot sodium sulfide solution. The dyes may be stripped with cold sodium hypochlorite. Azoic dyes are stripped by alkaline hydrosulfite as a rule, assisted by long-chain quaternary ammonium compounds, etc.

Vat dyes are difficult to strip, since in many cases the reduced dye cannot be removed from the fiber and is reoxidized in air. Addition to the hydrosulfite stripping bath of such substances as Lissolamine V, Albatex PO, or Dispersol VL, and magnesium sulfate have been recommended to facilitate the removal of the leuco-dye.

Stripping of dyed wool should be avoided wherever possible, because all stripping processes damage wool to some extent, particularly the finer wools. Most equalizing acid dyes are stripped by boiling the dyed material in a bath containing a large percentage of Glauber's salt. A more effective treatment consists in treating the material for 30 minutes just under the boil in a liquor containing, per 100 gallons, 2-5 lbs pyridine or Tetracarnit. When the acid dyes present do not level readily, a hot alkaline treatment with ammonia, which is more effective than Glauber's salt, is employed. Still more effective is a treatment with 4-8 percent of soda ash (on weight of material) at 40° C. The mordant dyes present difficulties in stripping. With certain chrome dyes it is facilitated by pre-boiling the material in a 0.5-1 percent solution of a mixture of hydrochloric and oxalic or citric acids for 20 minutes just under the boil, and then treating with a hot dilute ammonia solution. The acid treatment helps in splitting the dye lake.

A drastic method for stripping mordant-dyed woolen material is what is known as the "Chrome and vitriol strip." This treatment is largely given for colored rags, and consists in boiling the material in a solution containing 3-6 percent of bichromate and 6-12 percent of sulfuric acid (on weight of material). The use of sulfoxylate-formaldehyde compounds has now superseded the chrome and vitriol strip. Both sodium and zinc salts are used for this purpose, in a boiling bath acidified with formic or acetic acid. Other stripping agents such as potassium permanganate, hydrogen peroxide, and titanous sulfate are also employed, but to a lesser extent. Several other stripping processes for wool are also described.

Modification of the methods employed for stripping wool can be used for stripping silk materials. The greater resistance of silk to alkalis is of great advantage.

No general rule can be given for the stripping of dyes from acetate rayon. Unlevel dyeings can be corrected by a treatment in a 0.5 percent soap solution at 80° C. A more effective strip is obtained by the addition to the soap bath of 2 grams per liter of activated charcoal in presence of a protective colloid like glue.

Boiling soap solution is usually employed for levelling nylon dyed with insoluble dyes. An effective strip can be obtained by the use of acidified sulfoxylate formaldehyde or hypochlorite.

The author cites 40 references to the literature.—WHC

Protecting Wool Against Degradation

A J Hall, *Textile Mercury & Argus* 129, 470-2, 511, 517, September 11 and 18, 1953.

The wool fiber is susceptible to chemical attack during dyeing and finishing, and also in every day use. It consists of long molecules which lie reasonably parallel to each other, and which are linked together by comparatively short "disulfide" chains which extend at spaced intervals from the long chain molecules. These cross-linkages hold the parallel molecules together sufficiently to give the wool fibers an elastic semi-rigid structure which stands up well to the various strains and stresses imposed upon them when they form part of a fabric or garment.

However, the cross-linkages are weakened by alkalis, resulting in a gradual disintegration of the fiber. Similar changes can occur in treatments with acids and oxidizing and reducing agents.

Harris and Brown discovered a method whereby the disulfide cross-linkages in the wool fiber could be broken and replaced by dimethylene linkages of considerably greater stability. To accomplish this in stripping wool shoddy with alkaline sodium hydrosulfite, for example, ethylene dibromide was added to the stripping bath. It was found that carpets made from wool so treated gave a better wear value than those made from untreated wool.

To avoid the use of ethylene dibromide, which is toxic, formaldehyde has been employed. This is cheap and readily available, but has the disadvantage that the cross-linkages which it is able to form in wool fibers are only moderately stable to hot dilute acids.

The action of formaldehyde on the disulfide bonds in wool takes place at temperature of 50° C or higher, and at all pH values. A treatment with a 1 percent solution of formaldehyde at 50° C, at pH 6, for six to eight hours is stated to give maximum protection.

In treating wool with hydrogen peroxide it is necessary to use alkaline conditions (e g, pH 9-10). A pretreatment with formaldehyde, by steeping the wool in a 4-5 percent aqueous solution for ½ hour at pH 4.2, will protect the wool from deterioration during the bleaching operation. It is pointed out, however, that pretreated wool bleached with peroxide has slightly less affinity for acid dyes than untreated wool similarly bleached.—WHC

Flammability of Clothing Textiles

C A Baker, *Papers Am Assoc Textile Technol* 8, 194-8, September, 1953.

This review of technological developments in fabric evaluation is confined to the modern classification of textiles intended for use in wearing apparel and does not cover fire-retardant or fire-resistant textiles *per se*.

The author points out that fiber assembly in a fabric, particularly among cellulose-based fibers, is of greater importance in determining actual rate of burning than the fiber of which the product is composed. This knowledge has led to the development of a number of apparatus designed to measure rate of burning of textile materials.

The National Bureau of Standards has operated a Fire Resistance Section since 1913. The section developed the first model of a Horizontal Tester about 1937. This consists of a cabinet containing a sample rack, to hold the fabric, and a Terrill burner for igniting it. A temperature of 140° F is maintained in the cabinet. The time necessary to burn a 10-inch strip of fabric is recorded.

Some early forms of proposed legislation carried a description of a flammable fabric as one which burned or flashed in a horizontal position at greater average rate than one inch per second.

In the early 1930's the U S Testing Co developed its Ignition Tester for textiles. It consisted of a draft-proof chamber, open at the top, with means provided for vertical mounting of a test specimen, and a motor-driven micro-burner for an ignition source. The basis for evaluation was whether or not the textile material would ignite upon a momentary (approximately 1 second) exposure to an open flame.

In 1945 the State Fire Marshal of California started development of apparatus to determine rate of burning and ease of ignition. The two items of measurement were considered separately and for different classifications of material.

The Fire Marshal developed a wired rack support mounted at 45° and equipped to measure the burning time of a specimen over a fixed distance after ignition had taken place. This test apparatus made use of either an electrical element

or standardized gas flame for an ignition medium. The time of burning was automatically recorded between points on the rack. The second apparatus was designed for use with coated fabrics and films, and consisted of means for timing the exposure of the sample to a standardized electrical heating element.

Later developments in cooperative action with the AATCC Flammability Committee created modifications in the California rate-of-burning apparatus and test technique until the two systems were quite parallel. However, the California authorities are quite critical of what appears to be a lowering of standards in CS-191-53, which incorporates the AATCC technique, and in cases of dispute, reverts to the aforementioned wired rack and a six-second timing principle.

The AATCC Committee on Flammability was organized in 1945. The first model of a testing apparatus consisted of a wired rack which was adjustable from a horizontal to a vertical position, and was enclosed in a cabinet containing also a micro-burner. Investigations showed that horizontally positioned samples did not transmit the heat of burning in the same fashion encountered in actual wear, and that vertical mounting made it impractical to measure the rate of burning with simplified mechanisms. The 45° compromise angle was selected at this point.

The AATCC Flammability Tester, based on this principle, is described in detail.

The Flammability Fabrics Act (H R 5069) was signed by President Eisenhower in June, 1953. Its essential features are described by the author.—WHC

Detergents in Drycleaning

G P Fulton, J C Alexander, A C Lloyd, and M Schwartz, *ASTM Bull*, September, 1953, p 63-8.

When garments are drycleaned in an organic solvent containing no detergent, the drycleaning process removes much soil of a greasy nature and also removes some insoluble soil. It does not remove much water-soluble soil from fabrics. By "water-soluble soil" the reference is to materials such as salt and various sugars that are contained in many foodstuffs, drinks, and perspiration. Spots from water-soluble soil are usually removed from garments by a separate operation after the drycleaning process. This operation is known as "spotting." It involves the application of water or a mixture of water and various chemicals to local areas of a garment to remove water-soluble spots. Since each garment — and in fact each spot — must be treated individually, spotting is a rather costly process.

When a garment contains an unusually large amount of ground-in insoluble soil or is stained with quite a few water-soluble spots, the drycleaner must wet-clean it to restore it to a usable condition. Wet-cleaning is a water-cleansing process involving lukewarm water and a neutral soap or synthetic detergent. With many fabrics it must be a hand process. It is carried out in addition to the normal drycleaning operation. Moreover, wet-cleaned garments require more time for pressing. Thus the wet-cleaning of a garment involves considerable expense.

Usually when a drycleaner uses a detergent in his drycleaning solvent he hopes to achieve several ends:

1) By increasing soil removal and whiteness retention he hopes to give back to his customer a clearer, brighter garment.

2) He hopes the drycleaning detergent removes some water-soluble spots, and thus decreases somewhat the amount of spotting necessary after drycleaning.

3) He hopes that the detergent will decrease, at least to some extent, the percentage of garments that require wet-cleaning.

What the drycleaning industry needs, according to the authors, is products that will enable drycleaners to obtain a higher removal of water-soluble soil, without operating at a high enough relative vapor pressure of water to cause detrimental effects, such as wrinkling and shrinking of textiles.

The research work on this problem being conducted at the National Institute of Drycleaners, at Silver Spring, Md., is described in detail.—WHC

Mildewproofing of Canvas Products

H M Gadberry, *Textile J Australia* 28, 572-5, 608, July, 1953.

The action of mildew on cloth, such as cotton, may take two distinct forms. The cloth may be tendered and weakened through destruction of the cellulose of the fibers, or the mildew may only produce stains, which are very difficult to remove, but do not seriously affect the strength of the cloth. These two actions are caused by two distinct classes of fungi.

While the exact type of textile destruction varies with the organism concerned, it is the enzymes, acids and other destructive agents produced by the fungi which actually cause the damage to the canvas. The simple presence of a mildew organism does not damage the cloth. It is only these by-products of growth and reproduction that actually rot and destroy the cloth. If it is possible to maintain conditions under which the fungi cannot grow, mature, sporulate and reproduce, the attack on the cloth can be prevented.

For mildew-proofing canvas products such as tents, tarpaulins and awnings, the most important requirements are permanence, resistance to sunlight and water leaching and freedom from off-color and bad handling qualities. In other applications the main requirements might be complete absence of color, odor, skin irritation and sensitization, or low toxicity.

Most of the industrially important fungicides fall into the following classes: the metallics, phenolics, and the organic derivatives of nitrogen and sulfur. Of the metals used as fungicides, copper is by far the most important. It is outstanding in its toxicity to wood- and cotton-rotting fungi, and also helps to control surface-growing molds. Copper, at the concentrations used, is probably the least expensive of the industrial fungicides.

In the treating of canvas, copper naphthenate carries a major share of the load. It is cheap, soluble in inexpensive solvents, resistant to leaching, and extremely toxic to mold-producing fungi. On the debit side it stiffens fabrics, colors them, has an unpleasant odor and bleeds through paint, and thread treated with it is difficult to sew. In spite of these disadvantages it still has no competitor that will match it for both cost and effectiveness.

In many applications on military and industrial canvas products, copper naphthenate has been largely displaced by the relative newcomer, copper-8-quinolinolate. Practically no other compound will completely inhibit mold growth in as low a concentration as copper-8. Furthermore, the compound is non-toxic to humans and practically insoluble in water.

Another copper compound showing considerable promise is Dow's copper-3-phenylsalicylate. This compound was developed primarily for awnings, tarpaulins and shade cloth. Its primary claim to fame is the lack of tendering in the presence of sunlight.

The other metallics are not as generally useful as copper, but zinc naphthenate and other zinc compounds are used in awnings and textiles where the blue-green color of copper would be objectionable.

Among the organic fungicides, G-4 is colorless, free from skin irritation, quite resistant to leaching, and shows good inhibition of fungi. Salicylanilide, or Shirlan, because of its absence of color and odor and its low toxicity to humans has been particularly useful in preserving finished textiles. Hyamine 3258, a quaternary ammonium pentachlorophenate, is used in treating cotton thread for sewing canvas goods. It has good fungicidal properties and resists leaching.

Several other mildewproofing compounds are also described.—WHC

NEWS

• Intercontinental Chemical Corp Acquires Interest in Metro Dyestuff Corp

H W Grimmel, president of Metro Dyestuff Corporation, West Warwick, R I, announces that Intercontinental Chemical Corporation, Empire State Building, New York, has acquired an interest in Metro Dyestuff. Intercontinental Chemical Corporation is connected with Farbwerke Hoechst A G, Frankfurt, West Germany.

It is expected that, through this connection, certain research facilities in the development of new products in the dyestuff field will be made available to Metro Dyestuff Corporation.

Sales of Metro Dyestuff Corporation will continue to be made by Metro-Atlantic, Inc, and other established trade channels. There will be no change in management. E P Sommer of Intercontinental Chemical Corporation has been appointed vice-president of Metro Dyestuff Corporation effective April 1, 1954.

• Avisco Seminar for Textile Faculties

American Viscose Corporation will hold its third seminar on the latest developments in rayon and acetate and other manmade fibers for the faculties of the nation's eleven principal textile institutes at the Textile Research Department, Marcus Hook, Pa on June 16, 17, and 18. The first such seminar was held in 1946 and the second in 1950.

The general subjects to be covered by staff members of TRD and the corporation's Chemical Research Department, with opportunity for general discussion, will include the "Economic Significance of the Newer Fibers," "Processing Fibers in Blends," "Progress with Rayon, Acetate, Acrilan," "Crepe Fabrics as Seen by the Electron Microscope," "Finishing of Blended Fabrics," and "Fiber Behavior and Contribution to Blended Fabrics."

The "electives" will include lectures and discussions on dyeing and finishing and other textile subjects.

• New R & H Service Office

Rohm & Haas Company, Philadelphia, has announced the opening of a new service office at the warehouse of Ostdyk Warehouse Corp, 465 Boulevard, East Paterson, N J.

• General Aniline to Erect Chlorine Plant

Plans of General Aniline & Film Corporation to build a $3,000,000 multi-product chlorine-caustic plant have been completed. The new plant will represent a major step in the vertical integration of the Company's Dyestuff and Chemical Division, a management objective of many years. Plans call for the plant to be located on a site adjoining the installation of General Aniline at Linden, N J.

A substantial portion of the plant's output will be used in the Company's dye and chemical operations at Linden and at Rensselaer, N Y. Additional production of some of the chloralkali products will be available for sale in the industrial chemical area of northern New Jersey.

It is reported that the plant, with a rated capacity of 26 tons of chlorine a day, will also produce high purity caustic soda in flake form and in 50% solution; caustic potash of extreme purity in flake form and in 45% solution; water-white quality muriatic acid; and sodium hypochlorite. All of these products are currently used in large quantities by GAF.

• NID Graduations

April was graduation month at the National Institute of Drycleaning, Silver Spring, Md, for 12 silk finishers and 7 wool finishers as the 19th Silk Finishing Course and the Third Wool Finishing Course were completed.

The Institute also graduated 24 men from the Third Educational Conference for Associate Members, and 13 members from the 28th class to complete the Management Course.

• GDGA to Meet in Philadelphia

The Garment Dyers Guild of America is holding its 1954 Summer Clinic in Philadelphia on June 11th and 12th. Guild vice president Lawrence Jacobson is the host and the Jacobson Dye Works will be the scene of technical inspection on the part of Guild members and their guests.

Headquarters for the meetings are at the John Bartram Hotel where the Guild will meet for discussions after inspecting the equipment and processes at the Jacobson plant.

• MCA Annual Meeting

Admiral Lewis L Strauss, chairman of the Atomic Energy Commission, and the Rt Hon C D Howe, Minister of Trade and Commerce and Minister of Defense Production of Canada, will address some 600 members of the Manufacturing Chemists' Association and the Synthetic Organic Chemical Manufacturers' Association at the 82nd Annual Meeting of MCA at White Sulfur Springs, W Va, June 3-5.

• 69th Spring Meeting, DCNE

Frank W Benvie, General Dyestuff Corp, Boston, was elected president of the Drysalters Club of New England for the 1954-55 term at the 69th Spring dinner, which was held at the Hotel Vendome, Boston, Mass, on April 30.

Chester M Kopatch, Ciba Co, Inc, was named vice president and Azel W Mack, Dexter Chemical Corp, was re-elected secretary-treasurer. John Orminston, Jr, William W Pennock, Charles M Merritt and Adolph A Walz were named to the board of directors.

As part of a sport's night program, Lou Little, Columbia University football coach, addressed more than 200 members of the club. Seated at the head table with Mr Little were head football coaches Lloyd Jordan, Harvard; "Buff" Donelli, Boston U; Mike Holovak, Boston College, and Joe Zabilski. Joseph Buonanno of Metro-Atlantic, Inc, football star in the early 30's at Brown, introduced the speaker.

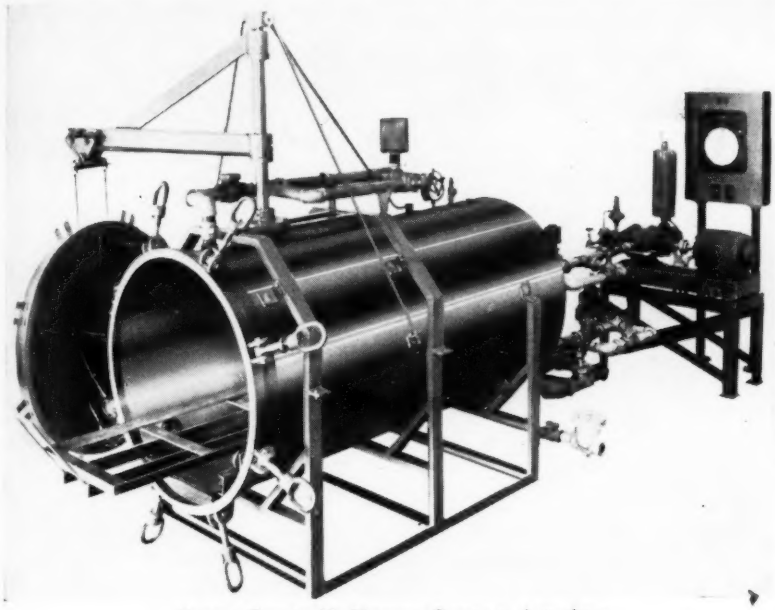
• Hening Named Ad Counsel for AMM

American Machine and Metals, Inc, announced last month the appointment of Hening & Company, Philadelphia, as advertising counsel for the U S Gauge, Gotham Instruments and AutoBar Divisions, all of which are located in Sellersville, Pa.

• American Alcolac Appoints New Distributor

Wasatch Chemical Co, 2225 South Fifth, Salt Lake City, Utah, has been named distributor of industrial chemicals and detergents by American Alcolac Corp, Baltimore, Md.

NEW PRODUCTS AND DEVELOPMENTS



Gaston County Hy-Vacuum Pressure Autoclave

• Hy-Vacuum Pressure Autoclave

Gaston County Dyeing Machine Co., Stanley, N C, has announced the development of a new controlled vacuum-pressure system for steam setting the twist in nylon Helanca yarns.

As the manufacturer points out, the entire process can be completed in 30 minutes or less, depending on steam injection cycle required; however, the primary purpose of the equipment is not to save time, but to improve quality. Positive shrinkage is claimed—yarn is shrunk and the twist is uniformly set from outside to the *spool core*.

Experimental projects now being conducted in several mills are said to indicate that this new equipment has a place in other types of steam processing. It is believed that results in woolen and worsted mills may lead to the replacement of conventional steam box methods from the standpoint of quality alone.

The process is completely automatic. Vacuum pump starts by means of a push button. 22" to 25" vacuum reportedly is produced in 2 to 3 minutes. Pump stops automatically. Steam is injected at controlled temperature for any desired time period and is expelled automatically. When processing is completed, vacuum relief values open to restore atmospheric conditions inside the vessel.

Built to customer specifications, according to ASME standards, the Hy-Vacuum pressure autoclaves can be designed to fit into existing systems using present pin racks and trucks.

• "Lanolized" Process

"Lanolized", a process that treats textiles with pure lanolin, is now being introduced into the women's intimate apparel market, with hosiery as the first product to which the new finish is being offered.

The process will soon be applied to a wide array of ladies' wear—slips, panties, brassieres, girdles, etc—with luxurious comfort and beauty the keynote.

Lanolized, Inc, 350 Fifth Ave, New York, N Y, is promoting the new finish.

• Malibu Develops "Nu-White" Process

A new method for dyeing and finishing white elastic materials to match the rigid cotton batiste being used in foundation garments has been developed by Malibu Fabrics, Inc, New York, N Y.

With the "Nu-White" process, regular batiste elastics using the more desirable lustrous yarns can be whitened to the degree and shade desired for matching purposes, it is claimed.

Malibu Fabrics, Inc, which conducts a technical information service for the trade, invites manufacturers to submit without obligation swatches for color matching.

Samples of elastic fabrics that have been matched to the various types of rigid fabrics in white are available for inspection at the Malibu showroom in the Empire State Bldg or can be obtained on request.

• Interchemical Announces New Process for Pad Dyeing Synthetics with Acetate Dyes

A new process for pad dyeing synthetics with acetate dyes has been announced by Interchemical Corporation—Textile Colors Division, Hawthorne, N J. The new process reportedly has been employed successfully for dyeing acetate, nylon, and Dynel. To date, it has been employed principally for dyeing woven fabrics, but it is stated that it should be equally satisfactory for dyeing knit goods, braids, and yarn in sheet form. Among the advantages cited for this process are excellent penetration of tightly woven fabrics; elimination of shaded selvages; easier shade control in cross-dyeing; and savings in dyeing time, steam and chemicals.

Essentially, the new method consists of passing the material through an aqueous pad liquor containing a highly dispersed acetate dye, a penetrant, a swelling agent, and a gum; then developing with hot water under controlled conditions of time and temperature. One modification is the addition of wetting agents or carriers to the pad liquor. Another is the incorporation of fast-to-light direct dyes to provide cross-dyed effects on mixtures or blends of acetate or nylon with cellulosic fibers.

The padder reportedly can be set up in range with a developing box and dry cans to permit dyeing, developing, and drying to be carried out in one continuous operation. Alternatively, the fabric can be pad dyed, plaited into boxes, and then developed later in jigs, boxes, or other suitable equipment.

• Two Textile Brighteners Offered by Hilton-Davis

The Hilton-Davis Chemical Co, Cincinnati, O, has introduced two new optical brighteners for application to a wide range of textile fibers.

The new whitening agents, Safaritone White WNOA and Safaritone White C, are described as economical and easy to apply.

• Stir-in Type Vinyl Paste Resin

Monsanto Chemical Company, Springfield, Mass, has announced the development of a stir-in type vinyl paste resin which will be designated as Opalon 410. It is said to possess excellent dispersion characteristics and reportedly blends quickly and easily with plasticizers.

• Cyana Superset Wrinkle-Resistant Finish

The development of Cyana Superset, a new wrinkle-resistant finish which is said to show an improvement in wrinkle recovery over the former finish as much as 18% before washing and 31% after washing, has been announced by American Cyanamid Company's Textile Resin Department.

L A Fluck, manager of the Department, points out that, even under the severe conditions of the official AATCC accelerated chlorine test, Cyana Superset-finished fabrics have shown little or no loss in tensile strength and little or no yellowing. The new finish is also said to reduce bleeding of direct dyes and improve washfastness of many types of dyes.

• Dexter Announces New Dyeing Assistant and Scour

Dexapol 99, a dyeing assistant and scour developed specifically for use in the Burlington nylon tricot dyeing machine, has been announced by Dexter Chemical Corp, 819 Edgewater Rd, New York 59, N Y.

The necessity of adding solvents to the liquor when scouring and dyeing synthetic fibers in the Burlington machine is eliminated when Dexopal 99 is employed, the company claims. This new agent is said to promote levelness and penetration and also to keep dirt and grease emulsified. It has been found effective in the reduction of air pockets which lead to uneven dyeing, Dexter reports, and foaming is cutdown to the minimum by Dexopal's antifoam charactertistics.

Announcement of the new dyeing assistant follows upon Dexter's recent decision to enter the nonionic field with polyoxyethylated fatty alcohols. Four dyeing assistants of the nonionic type (Telkanol O, Dextrol Fast Salt M, Rexan O and Telkanite M) were announced to the trade earlier this year under a sales and advertising program with the theme of "Four Aces of Dyeing."

Other textile chemical agents recently announced by Dexter are said to improve the fastness of dyestuffs on acetate, cotton and rayon fabrics. They include Dextrol Antifume A-15 and Dextrafix B.

Data sheets are available from the manufacturer on request.

• New Du Pont Yarns

Introduction of a line of Du Pont spun-dyed acetate yarns in bright eye-catching colors was announced recently by Du Pont's Textile Fibers Department, Wilmington, Del.

Standard colors available in stock quantities are navy-blue, black, scarlet, and maroon. Irish green and gold will be available shortly. Other colors under consideration are chartreuse, copper, Oriental blue, and coral.

• Latest National Aniline Colors

National Aniline Division, Allied Chemical & Dye Corporation, 40 Rector St, New York 6, N Y earlier this month announced three new colors to the trade: *National Erieform Yellow GR*, another addition to the Division's line of nondusting direct dyes; *National Carbanthrene Brilliant Violet RK Double Paste*, a recent addition to National's line of anthraquinone vat dyes; and *National Solantine Blue BLL*, a new addition to their line of lightfast, nondusting direct dyes.

Other recent additions to National's lines include *National Solantine Blue GLFV*, *National Solantine Blue SFRL*, and *National Solantine Brown 3RL*, nondusting, lightfast direct dyes; *National Solvat Blue 4B*, a leuco vat ester; *National Naccogene Blue DGN Powder*, a stabilized azoic dye; *National Chromolan Red GRE*, a nondusting, premetallized acid dye; *National Carbanthrene Brown ARN Double Paste* and *National Carbanthrene Olive G Paste*, anthraquinone vat dyes; and *National Garnet GBC Salt*, a stable diazonium salt.

• Westvaco Introduces New Textile Chemical

Westvaco Chemical Division, Food Machinery and Chemical Corp, 161 E 42nd St, New York 17, N Y, has introduced Hexaphos,* a true phosphate glass (with average P_2O_5 content of 67.5%), which is said to exhibit superior water-softening and sequestering properties.

It is claimed that the gums used in the preparation of textile printing pastes are effectively reduced to the proper viscosity and smoothness with minimum amounts of the new chemical. Prevention of lime-soap spots or other lime deposits is the main purpose of Hexaphos in kier boiling, scouring, carbonizing, boil-off, soaping, dyeing, bleaching, backwashing, fulling, silk-soaking and degumming. Its peptizing or dispersing properties are utilized in sizing, delustering, dyeing and printing.

* Trade mark.

• Pigment Auxiliaries Available from Carbide

Acetoacet-o-anisidide and acetoacet-m-xylidide are now being produced in this country and are available from Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd St, New York 17, N Y. Both are important in the manufacture of yellow benzidine pigments. Pigments prepared from acetoacet-m-xylidide are used in printing inks and textile printing.

• "Kayphenates"

The potassium salts of pentachlorophenol and orthophenylphenol are now available commercially for the first time, according to a recent announcement made by Naftone, Inc, 515 Madison Ave, New York 22, N Y.

The Kayphenates, the trade name of these new products, are being made by the Associated Sales and Supply Co at their plant in St Louis from substituted phenols produced by Monsanto Chemical Company.

Samples and literature may be obtained by writing directly to Naftone.

• Nopco Detergent 1479-A

The Nopco Chemical Company, Harrison, N J, announced this month the introduction commercially of a new all-purpose synthetic detergent for the textile industry. Made from vegetable and animal oils and fats, the new product (Nopco 1479-A), is packaged in 55-gallon steel drums. A liquid fatty alkylolamide condensate, it is said to exhibit superb cleansing properties, a heavy body consistency, and high foaming action.

• New Geigy Products

Recent additions to Geigy Dyestuffs' line of colors include *Irgalan* Red 3G*, a dyestuff designed for use when good light fastness and excellent wet fastness are essential; *Cuprophenyl* Violet 3RL*, a new member of the Division's Cuprophenyl line; and *Erio Navy Blue M*, designed primarily for the coloring of filament and spun nylon.

Bulletin 58 on Cuprophenyl* Violet 3RL and Bulletin 59-G on Irgalan* Red 3G are available from Geigy Dyestuffs, 89 Barclay St, New York 8, N Y.

* Registered trademark.

• Nonic 300 Surface-Active Agent

Nonic 300, a polyethylene glycol alkylphenyl ether nonionic surface-active agent, has been announced by Sharples Chemicals Inc. This new product is said to be characterized by excellent stability to acids, alkalies and oxidizing agents.

Nonic 300 can serve as a wetting agent, detergent and an emulsifying agent. It is said to be effective over a wide range of water hardness, pH and temperature, is soluble in water, many chlorinated compounds, alcohols, ketones, esters and aromatic hydrocarbons, and is compatible with soap and synthetic anionic and cationic surface-active agents.

Sharples Data Sheet C-54 describes the new product.

(Additional new products on page 356)

NAMES IN THE NEWS

K M Irey

KENNETH M IREY has been elected assistant vice president of Heyden Chemical Corporation.

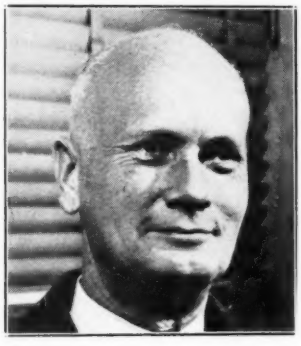
Mr Irey has been chemical production manager since 1953.

SEVERAL major revisions in staff assignments have been made by Textile Research Institute, Princeton, N J. JAMES H WAKELIN has decided to vacate his post of director of research in order to engage in private consulting, but will continue his connection with the Institute with the title research associate.

Effective July 1, 1954, J H DILLON will again assume direct responsibility for the Institute's research program and he has announced the following promotions of key staff members who will assist him in its prosecution: HOWARD J WHITE, JR and HELMUT WAKEHAM will be associate directors; JOHN MENKART and JOSEPH H DUSENBURY will be assistant directors. Each of these men will have added responsibilities but their primary activities will continue in the fields in which they are presently engaged; Dr White — physical chemistry, particularly dyeing phenomena; Dr Wakeham—cotton fiber studies; Dr Menkart—wool fiber studies; Dr Dusenbury—chemical physics.

JULIAN S JACOBS will continue as director of publications in the New York location and PAUL C ALFORD, JR will henceforth have the title executive secretary.

AT the 61st Annual Business Meeting and dinner of the Colorists' Club held recently at the Hotel Martinique, New York, NELSON BARLOW, plant manager of the Apponaug Co, Apponaug, R I, was elected president for the ensuing year and P J WOOD, technical director of Royce Chemical Co, was reelected secretary. DENIS de GOENCZ, manager of J L Stifel & Sons, Wheeling, W Va, is the retiring president.



J Hilldring

AT a recent meeting of the Company's board of directors, JOHN HILLDRING was elected executive vice president of General Aniline & Film Corporation. He has served GAF as senior vice president since June, 1953.

In other executive appointments announced earlier this month by GAF, HANS BELLER, formerly Process Engineering Department manager at the Linden (N J) plant, has been named project director of the Company's new manufacturing operations to be constructed at Calvert City, Ky. DAVID B ANDREWS, formerly a department manager of the Company's dyestuff and chemical plant at Resselaer, N Y, succeeds Dr Beller at the Linden plant.

M S Lachner

ANNOUNCEMENT has been made by the Colgate-Palmolive Company of the election of MARSHALL S LACHNER and ROBERT E HILBRANT as vice presidents of the Soap Sales and Toilet Articles Divisions respectively.

Mr Lachner moves up from the post of manager of the Company's Soap and Industrial Sales Department, and Mr Hilbrant, from the post of manager, Toilet Articles Sales Division.

L A Fluck

LINTON A FLUCK, formerly assistant manager of the Textile Resin Department, Organic Chemicals Division, American Cyanamid Company, Bound Brook, N J, has been appointed manager of the Department. The appointments of THEODORE F COOKE as assistant to the Department manager and PHILIP B ROTH as manager of its Application Laboratory were announced simultaneously. Dr Cooke moves up from the post of manager of the Textile Resin Laboratory. Mr Roth has been a group leader since 1953.

CHARLES R WITSCHONKE has been named manager of the newly formed Physical-Analytical Section of Cyanamid's Research Division, Bound Brook Laboratories. He was most recently head of the Physical-Chemical Measurements Laboratory at Bound Brook.

EMIL HLADKY will serve as manager of Cyanamid's new titanium dioxide pigment plant now under construction near Savannah, Ga. Since 1952, Mr Hladky has served as manager of the Company's ultramarine blue plant at Newark, N J.

Other news of note from the Cyanamid organization includes the move of ERHART K DRECHSEL from the Research Division, Stamford Laboratories, to the Market Research Department. The New Product Department has added J P MILIONIS, formerly of the Stamford laboratories, and T M VIAL, formerly of the Industrial Chemicals Division.

FIVE appointments in the New York Executive Office have been announced by Solvay Process Division, Allied Chemical & Dye Corporation.

DENMAN PENISTON has been appointed assistant to the president and JOHN H ELLEMAN succeeds Mr Peniston as director of sales. Appointed assistant directors of sales are ARTHUR PHILLIPS, JR, HARRY R STOOTHOFF and NEAL M DRAPER.

E E St Louis

ERNEST E ST LOUIS has been made development director of Synthron Inc, Ashton, R I, after having headed a number of development projects for Warwick Chemical Co, Div of Sun Chemical Corp.

Mr St Louis' new duties will include the supervision of Synthron's Service and Development Laboratories and the conduct of all plant trials for new products prior to their release to the company's Sales Department.

CELANESE CORPORATION OF AMERICA has announced the promotion of DAVID D HECHT, former director of the Application Laboratory, Summit, N J, to the post of manager, Product Development Department. MICHAEL J CURRY succeeds Mr Hecht at Summit.

JOHN PAUL McGINTY has joined the Southern sales force of the Laurel Soap Mfg Co, Inc, Philadelphia, Pa.

L B ARNOLD, JR has been named technical textile consultant for American Alcolac Corp, Baltimore, Md.

In his capacity with American Alcolac, Dr Arnold will specialize in the sales of detergents and chemicals to textile mills and supervise Alcolac's Textile Customer Service Department.

L B Arnold, Jr

C R Bellwood

CARL R BELLWOOD has been appointed to the post of technical director of the Textile Division of Polymer Industries, Inc, Springdale, Conn. He comes to Polymer from the Frank B Ross Co, Jersey City, N J, where he held the post of division manager and technical director.

Mr Bellwood is chairman of the AATCC Committee on Water Resistance of Fabrics.

OAKITE PRODUCTS, INC, has assigned the following new technical service representatives:

RICHARD J PRICE, to the Portland, Ore, area; MALCOLM N GRAY, Lincoln, Neb; JOHN N LEE, Miami, Fla; GALE R MILLER, Cincinnati, O; KENNETH L OLIVER, Fort Wayne, Ind; THOMAS D ELLSWORTH, Grand Rapids, Mich; D O MUNDALE, Asheville, N C; HASKELL WILDER, LaCrosse, Wis; LLOYD W KAGLEY, Knoxville, Tenn; WILLIAM D HUDSON, Topeka, Kan; and HENRY W DIETER, Youngstown, O.

JOHN W STEWART has been named New England sales representative for textile and paper resin products by Monsanto Chemical Company's Plastics Division. His area of operations will include Maine, Massachusetts, New Hampshire and Vermont.

Since 1950, Mr Stewart has served Monsanto as field research supervisor for textile chemicals.

J W Stewart

L B Henriques

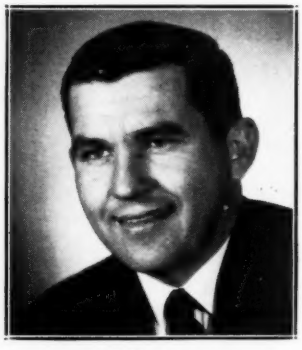
LAURENCE B HENRIQUES, assistant secretary and assistant treasurer of the Presbyterian Hospital in the City of New York, has been appointed vice president of J B Henriques, Inc, New York chemical and plastics dealers.

ANDREW S CLARK, an engineer at Allied Chemical's Solvay Process Division, has been awarded an Alfred P Sloan Fellowship at Massachusetts Institute of Technology. Mr Clark is currently project manager in charge of construction at Solvay's Moundsville, West Virginia plant.

F J RAUSCHER, formerly district sales manager of the St Louis office, Carbide and Carbon Chemicals Co, will serve in that capacity with the newly formed Southwestern Division, which embraces nine states. H L HARWELL succeeds Mr Rauscher in the St Louis post.

Carbide has also announced the following new district sales managerships: J W ROSS—Pittsburgh; J R HULTEN—Philadelphia; and J F LUTHER—Albany.

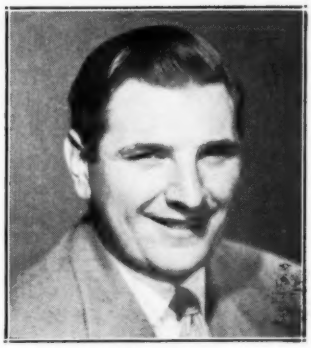
JAMES F McALISTER has been appointed to head the Dyestuff Laboratory of E J Feeley Company's Charlotte, N C office. His previous connection was with Wilkes Hosiery Mills Co, North Wilkesboro, N C.



J F McAlister

J Dillon

L M Ludlow



J E Quinty

S A Segal

R W Moister

W J Major

JAMES A DILLON has been elected vice president, and S A SEGAL, secretary, of National Starch Products, Inc, New York.

Mr Dillon, with the Company since 1938, was most recently secretary and director of synthetic resin development. Mr Segal joined National Starch in 1947.

HOWARD G VESPER, vice president of Standard Oil Company of California, is the new president of the Industrial Research Institute, Inc. Mr Vesper, also president of Standard's subsidiary, the California Research Corporation, was inducted at the closing session of the Institute's Annual Meeting in the Fairmont Hotel.

E D REEVES, executive vice president of Standard Oil Development Company, New York, was elected vice president, succeeding Mr Vesper. Mr Reeves automatically succeeds to the presidency in 1955.

New members of the Board of Directors, elected to three-year terms, are WARNER EUSTIS, director of research, The Kendall Company, Boston; F W STAVELY, director of Chemical and Physical Research Laboratories, The Firestone Tire & Rubber Company, Akron; and R E BIRCH, director of research for Harbison-Walker Refractories Co, Pittsburgh.

C G WORTHINGTON continues as secretary-treasurer of the organization.

MICHIGAN ALKALI DIVISION, Wyandotte Chemicals Corp, Wyandotte, Mich, has announced the appointment of LEWIS M LUDLOW, former assistant to the manager of synthetic detergents, as field representative of the Pacific District Office in San Francisco. R W MOISTER has moved from the Eastern District Office in New York to the Central District Office, where he will serve as resident sales representative.

THE Labels and Precautionary Information Committee has elected JAMES S WALKER, manager, technical sales services, Hooker Electrochemical Co, as chairman, and WILLIAM S KNAPP, General Chemical Div, Allied Chemical & Dye Corp, as vice-chairman. Mr Walker, former vice-chairman, succeeds ROBERT D MINTEER of Monsanto Chemical Co.

Associated with the Manufacturing Chemists' Assn, this Committee is active in establishing and fostering principles and techniques for adequate precautionary labeling of hazardous materials.

WILLIAM A PETERSON was elected vice president of the American Oil Chemists' Society on April 12th. The action was taken at the Society's Annual Meeting at San Antonio, Texas.

Mr Peterson is head of the Standards and Plant Auditing Division of the Department of Research and Development, Colgate-Palmolive Company, Jersey City, N J.

J E QUINTY has assumed sales responsibility in Northeastern Pennsylvania and parts of Northern New Jersey for Emery Industries Inc, Cincinnati, O. He had previously been assigned to the home office sales staff.

A new appointee to Emery's sales staff is W J MAJOR.

NEW assignments at Hooker Electrochemical Company:

Chlorination Research Group, Research and Development Dept———JOSEPH J WYLEGALA and EMIL J GEERING

Plastics and Resins Group, Research and Development Dept ——— PAUL E HOCH

Pilot Plant Group, Research and Development Dept———ALEX KATONA

Process Study Group ——— BENJAMIN B HALLECK, WALTER L CHEMERYS, RAJINDER KUMAR NARANG, HENRY T COLE, JR and JAMES J GALLERY, JR

Laboratory Chemistry———ROBERT F SUPCOE

J B GOLDBERG, consultant to the textile and allied industries, is scheduled to be the opening speaker of the Technological Section of the International Congress of Man-Made Textiles in Paris, France on May 31st. His subject will be "American Developments in Rayon and Acetate Fabrics".

THE Textile Color Card Association of the United States announced the retirement of MARGARET HAYDEN RORKE, secretary and managing director of the Association, on May 1, 1954.

The announcement was made by ROY E TILLES, president of the Association, who said, "Mrs Rorke is retiring to private life and will establish her home in California and it is with deep regret that we accept her retirement. She has served the Association with great distinction during the past thirty years as secretary and managing director. Mrs Rorke has also been prominently active in national trade association affairs and a leader in the promotion of industrial color standardization and color coordination".

Mr Tilles also made known that the board of directors has named ESTELLE M TENNIS as executive secretary. Miss Tennis has served the Association for a number of years as assistant to the managing director.

WILLIAM V CLEMINSON has joined the staff of Catalin Corporation of America as controller. Prior to Mr Cleminson's association with Catalin Corporation he was with L E Waterman and Company for ten years as assistant secretary, treasurer, and controller.

JAMES R KILLIAN, JR, president of the Massachusetts Institute of Technology, will deliver the principal address at the Lowell Technological Institute's Commencement ceremonies on June 7.

HUBERT A DES MARAIS has joined the Industrial Chemicals division of Geigy Chemical Corporation and is assuming the managership of this division.

Mr Des Marais was until recently the general sales manager of Pennsylvania Salt Mfg Co, Washington.

ATLAS POWDER COMPANY has named DIXON C VAN WINKLE to manage its chemicals department's New York District sales office.

Mr Van Winkle, who joined Atlas in 1952 as a special sales assistant, succeeds L G PARKINSON, recently resigned.

WILLIAM J McALARNEY, ROBERT S MUELLER, JR, and ROBERT LESSING have been transferred to the New York nylon sales office of Du Pont's Textile Fibers Department.

Mr McAlarney was formerly in the Providence, R I, nylon sales office and Mr Lessing was transferred from the Philadelphia, Pa, nylon sales office. Mr Mueller was transferred from the department's market research group.

JOSEPH L DAVIDSON and JAMES C SALMON, formerly in the New York nylon sales office, have been transferred to the market assistance group and export sales, respectively. Both will remain in New York.

THE Colgate-Palmolive Company and the University of Illinois have announced the appointment of M FRANK HERSMAN to the Colgate Fellowship in Chemi try at the University.

OBITUARY

Swanie S Rossander

SWANIE S ROSSANDER, assistant director of the Jackson Laboratory, E I du Pont de Nemours & Co, Inc, died at his home in Wilmington, Del, on April 17. He had been ill for several months and had been on leave from the Company since last September.

Born in Red Oak, Iowa on May 15, 1904, Dr Rossander received his BS from Tarkio College and his MA and PhD from the University of Illinois. He joined Du Pont at the Jackson Laboratory in 1930, and during his tenure there, with co-workers, had 55 patents issued to him.

Dr Rossander's activities in numerous technical societies included those in AATCC.

He is survived by his wife, Blanche, and a son, Quinn, 15.

Allen R Fuller

ALLEN R FULLER, 60, head of the textile section of the A E Staley Manufacturing Co's research department, died April 19 at Decatur, Ill. A graduate of the Lowell Technological Institute with a degree in textile chemistry, Mr Fuller had been with the Staley Company since 1931.

New Products and Developments——

(Concluded from page 352)

• Hooker Offers Anhydrous Caustic Soda in Three New Sizes

Hooker Electrochemical Company, Niagara Faalls, N Y now offers three additional particle sizes of anhydrous caustic soda. Newly-installed flaking and auxiliary equipment reportedly enables Hooker to produce fine flake, crystal flake and powdered forms in addition to the regular flake, solid and liquid forms.

The new forms are available in open head drums as well as in the regular drums with 14-inch off-center caps.

The screen sizes for the new forms, which sell at the same price as the regular flake, are as follows: fine flake (dustless)—through 4 caught on 20 mesh; crystal flake (dustless)—through 8 caught on 20 mesh; powdered—through 20 mesh.

• Emery Plasticizers Increased in Supply

The Plastolein Plasticizers are now available in greatly increased quantities, including Plastolein 9058, DOZ (di-2-ethylhexyl azelate) and 9057 DIOZ (di-iso-octyl azelate).

This stepped-up production is the consequence of Emery's new ozone-oxidation plant.

• New Unit Measures Level of Liquid in Closed Tank

Development of an instrument to measure the level of liquids in a closed tank, either under pressure or vacuum, was announced recently by the Industrial Division of Minneapolis-Honeywell Regulator Company (Philadelphia).

The new instrument, known as a "differential converter", converts differential pressure into proportionate air pressure which in turn is transmitted to indicators, recorders and controlling equipment.

When used with either strip chart recorders or circular chart recorders, the differential converter will furnish records for operation analysis, inventory checks and cost accounting purposes. Request Bulletin 2291 for further information.

• Cyanamid Offers Two New Gray Resin-Fast Dyes

Two new colors which round-out its line of resin-fast dyes have been announced by the Dyestuff Department of American Cyanamid Company, Bound Brook, N J. Both dyes, Calcodur Resin Fast Gray 2G and Calcodur Resin Fast Gray B, have been developed especially for dyeing viscose or cotton fabrics which are finished with durable resin finishes.

Calcodur Resin Fast Gray 2G is a green-gray and Calcodur Resin Fast Gray B is a full blue shade gray.

• New GE Silicone Ingredient

The General Electric Company's Silicone Products Department, Waterford, N Y, has developed a new silicone ingredient for textile finishes—G-E Dri-Film* water-repellent—which is said to provide durable water-repellency, often for the life of the garment. Treatment with G-E silicones, according to General Electric, considerably enhances the drape and appearance of most synthetic fabrics.

* Reg U S Pat Off.

tant di-
ory, E I
ed at his
pril 17.
ths and
ompany

May 15,
BS from
d PhD
e joined
tory in
re, with
o him.
merous
ose in

Blanche,

of the
ey Man-
nt, died
graduate
Institute
try, Mr
ompany

New

-out its
nounced
merican
k, N J.
Gray 2G
B, have
eing vis-
finished

G is a
ast Gray

redient

y's Sili-
aterford,
cone in-
-E Dri-
said to
y, often
reatment
General
e drape
fabrics.

4. 1954